



COMMERCIAL AIR CONDITIONERS

Centrifugal Chiller

2012



GD Midea Refrigeration Equipment Co., Ltd.
Have received ISO 9001 certification for quality assurance.
Certificate Registration
NO.01 100 019209



GD Midea Refrigeration Equipment Co., Ltd.
Have received environmental management system
Standard ISO 14001 certification
Certificate NO.CC 1417

Commercial Air Conditioner Business Units
Midea Air Conditioning and Refrigeration Sector
Add: West region of Midea commercial air conditioner department, Industry Avenue,
Beijiao, Shunde, Foshan, Guangdong, P.R. China Postal code:528311
Tel: +86-757-22394101 Fax: +86-757-26338003
<http://www.midea.com> <http://www.mideaaircon.com>

Note: The data in this book may be changed without notice for further improvement on quality and performance.



Corporate Introduction

Midea Group

From its humble beginnings in 1968, Midea has developed into a large corporation, covering HVAC, appliances, lighting, industrial components, logistics, and real estate. Its 40 years of relentless growth has brought its global turnover to \$14 billion USD in 2009. Consequently, Midea has created over 150,000 jobs both within China and all over the world. In addition to providing affordable goods to consumers worldwide, Midea is a responsible corporate citizen, and has contributed to several social causes.

Midea believes in creating value through rapid response to market demands, cost-efficient operations and consumer satisfaction. As a result, Midea wields vast production capacities to meet these demands, a fully integrated manufacturing process, and a comprehensive range of affordable, high-quality products to serve its global customers.

Today, Midea is a home appliance leader in China. The company continues to actively globalize its operation by opening plants in Vietnam, Belarus and Egypt. Additionally, Midea has several forthcoming plants in order to offer enhanced products and services closer to the market.



Midea CAC (MCAC)

As a key part of Midea Group, the Midea Central Air Conditioner (CAC) Business Unit is a professional CAC products supplier and commercial products solution expert. Since 1999 Midea central air-conditioner contributes to the commercial product R&D and technology innovation. By cooperating with the international enterprises plus the independent R&D, Midea CAC achieves big success in the commercial air-conditioner market and has established thousands of sample projects all over the world.

Right now Midea CAC is one of the most professional CAC products supplier as well as the professional project solution provider in marketing, sales, project design and after service etc.

MCAC Chongqing factory with 14 product lines concentrates on the water cooled centrifugal / screw/ scroll chillers, Air cooled screw/ scroll chillers, AHU/FCU etc.

MCAC Shunde factory with 31 product lines concentrates on the VRF (DC inverter product/ Digital scroll product), split product, heat pump water heater, AHU/FCU etc.

MIDEA CHILLER MANUFACTURING-BASE INTRODUCTION



With 46 years experience in chiller industry, Midea Chongqing chiller manufacturing base is becoming one of the largest chiller company in China. It covers an area of 800 Mu (137 acre), with a registered capital of 12.5 million US \$ and a total investment of over 0.6 billion US\$. There are 6 product series and over 100 model products including centrifugal chiller, screw water chiller, scroll water chiller, water-cooled packaged unit, and central air-conditioning indoor terminal device(AHU/FCU). Five chiller manufacturing shops with 14 flexible production lines lead an anual manufacturing capacity of 250 units centrifugal chiller, 1000 units of air cooled screw chiller, 2000 units of water cooled screw chiller and 200000 units of AHU product.

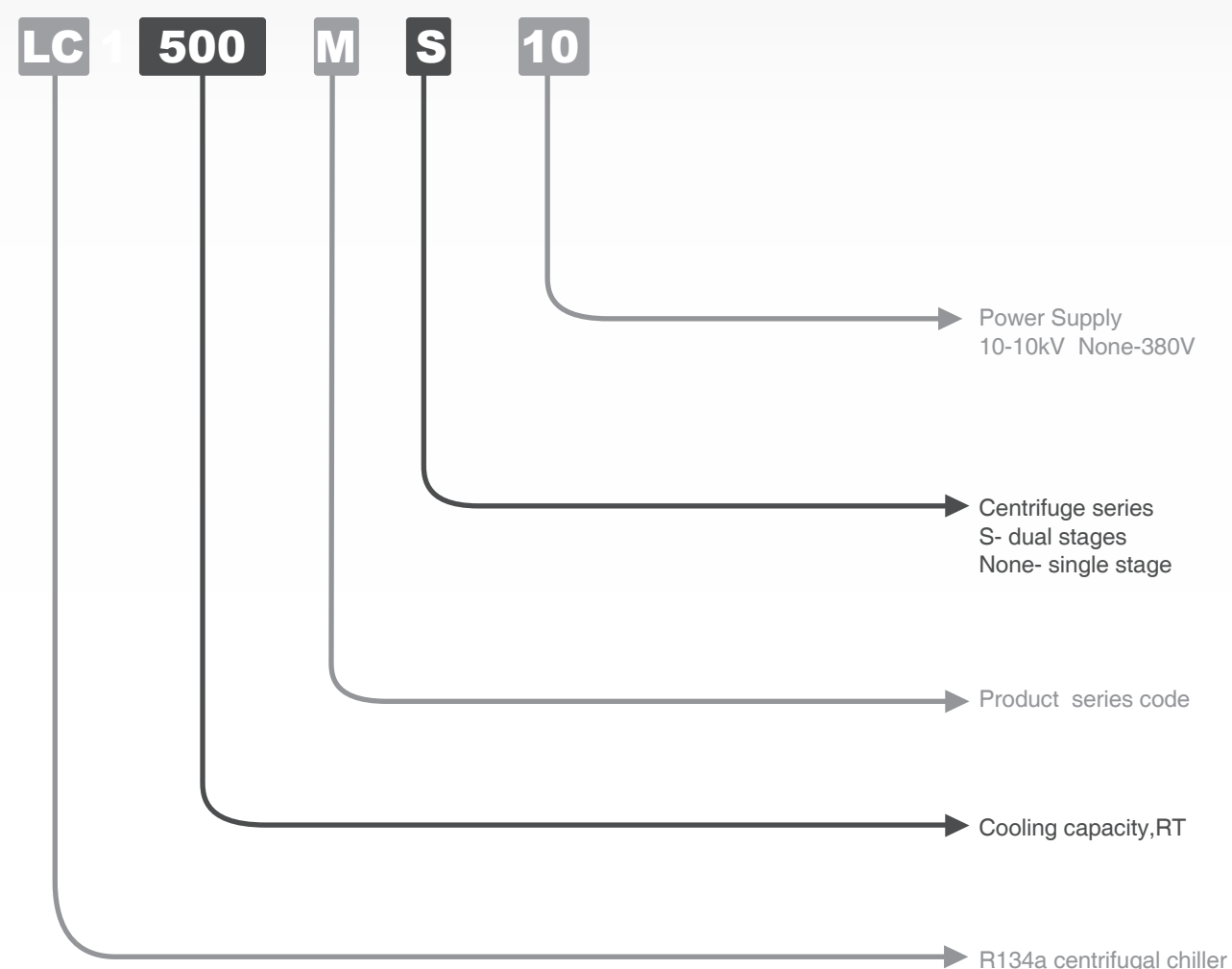
Strong R&D and manufacturing capacity makes Midea Chongqing general become the fastest developing company in chiller industry. The chiller test lab which is certified by China National Refrigeration Equipment Inspection Center is the largest refrigeration test capacity in Asia. The engineer team with 100 top engineers and 2 chiller experts who were awarded by the central government in structure, electricity, performance testing and software aspect makes Midea the headship in chiller industry. In the year of 2011 Midea refrigeration group invests another 150 million RMB for test lab as ARI test floor, big capacity air cooled screw life span testing room, 1500kW compressor motor test floor, etc.

Concentrating on energy-saving and ejection-decreasing, Midea Chongqing chiller factory commits itself to the reliable and high efficiency products for the world. The chiller products are widely used in different countries and obtain good public praise from the clients. The solutions for the Beijing capital international airport ,Jakarta international airport, China rapid transit station won good feedback and commendation. Continuing with the past and opening up the future, Midea chiller brand will go further and create an illustrious future.

CONTENTS

▶ 05	Nomenclature
▶ 06	Features and benefits
▶ 09	Specification
▶ 14	Performance curve
▶ 16	Dimension
▶ 24	Refrigeration cycle
▶ 25	Microprocessor control
▶ 30	Typical wiring diagram
▶ 35	Mechanical specification

NOMENCLATURE



FEATURES AND BENEFITS

Near half a century of experience in design and manufacture of the chiller product enable Midea Company continues deliver products of high quality, high reliability and high efficiency to our customers all over the world. Midea independent designed second generation "Smart Star" centrifugal chiller use environment friendly R134a refrigerant which is not subject to scheduled phase out. And it has been proven can achieve high efficiency without compromising the environment and the effects of direct and indirect global warming potential are dramatically diminished.

■ Environment Friendly R134a

Environment and its sustainability is the responsibility of any company who can supply excellent products and service to the customers. Midea has long been committed to the environment and its sustainability, the Midea "Smart Star" centrifugal chiller provide our customers with a non-ozone depleting R134a refrigerant that can achieve high-efficiency, Chlorine-free, long-term solution without subject to refrigerant phase out. At the same time, R-134a chillers operate with the entire system above atmospheric pressure at all times, no need purge unit. In the event of a small leakage, refrigerant escapes from the chiller to the atmosphere, that allows easy detection and repair. And R134a features lowest toxicity and flammability rating which translate into lowest hazard.

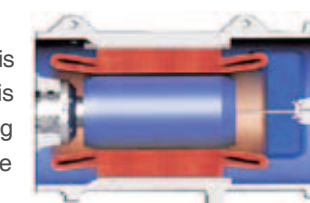


■ High Reliability

Single-stage Semi-hermetic positive pressure compressor utilizes advanced international leading NREC design technology. Single-stage design eliminate the additional moving part in the multi-stage compressor, such as second impeller, this feature increased the reliability. The refrigerant cooled hermetic motor sealed from the external air and environment that greatly eliminates the contaminant possibility. Combine with shell-tube type heat exchangers designed, manufactured and tested according to the national standard of China. These practice ensure Midea centrifugal chiller achieve high reliability.

■ Semi-hermetic Motor

The motors are hermetically sealed from the machineroom, cooling is accomplished by spraying liquid refrigerant on the motor windings and shaft. This highly efficient cooling method results in the use of smaller, cooler-running motors. As a result, hermetic motors require lower inrush current and are smaller, lighter and quieter than comparable air-cooled motors.



■ Modular Construction

The evaporator, condenser, and compressor assemblies are completely bolted together, making the chillers easy to disassembly and reassembly at the jobsite. This feature makes the chiller easy for transportation and lessen access problem in the jobsite. This attribute can mean considerable installation cost savings on many retrofit applications that may have limited doorway size.

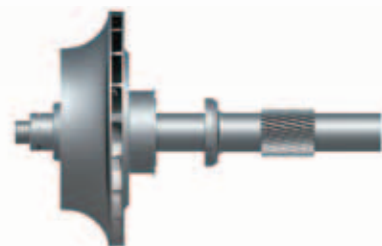
■ High Efficiency Fully-shrouded Impeller

Fully-shrouded impeller features high strength aluminum-alloy backward curved vanes, refrigerant gas flows through the internal impeller passages without hydraulic interaction with the stationary casing walls. The impeller is designed for balanced thrust and is dynamically balanced and over speed tested.



■ Keyless Impeller Coupling

The impeller and the main shaft are coupled by keyless connection, it eliminates stress concentration on the power transmission surface and thus the life span of the impeller is greatly increased. Since there is no friction, the efficiency is higher than the traditional key coupling. This unmatched mechanical design was awarded by the State Intellectual Property Office of P.R.China. (Patent No.ZL 01 2 56825.2)



■ Precise Gearing

The specially engineered, single helical gear with crowned teeth keep more than one tooth in contact at all times to provide even distribution of compressor load and quiet operation. Gear tooth surfaces are case hardened and precision ground which can reach the class of 5. Gears are integrally assembled in the compressor rotor support and are oil film lubricated. Each gear is individually mounted in its own journal and thrust bearings to isolate it from impeller and motor forces. The double layer soundproof compressor design prevents the gear contacting noise.



■ Lower Sound Levels and Vibration

Special engineered gearing, double soundproof gearbox structure, optimized impeller and tunnel design ensure our chiller achieve lower sound levels. A gear-driven compressor runs at higher impeller rotational speeds but tends to have less vibration than the larger, much heavier, direct drive units.

■ Advanced Capacity Adjustment

Inlet guide vanes work together with moveable diffuser lead to stepless capacity range from 10% to 100% and free of surge. This is why Midea centrifugal chiller can achieve high part load efficiency. And this technology was awarded by the State Intellectual Property Office of P.R.China. (Patent No.ZL01 2 56824.4).

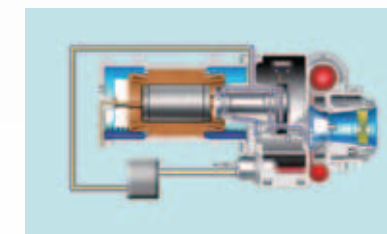


■ Condenser Baffle

The baffle prevents direct impingement of high velocity compressor gas onto the condenser tubes. That eliminates the related vibration and wears of the tubes and distributes the refrigerant flow evenly over the length of the vessel for improved efficiency.

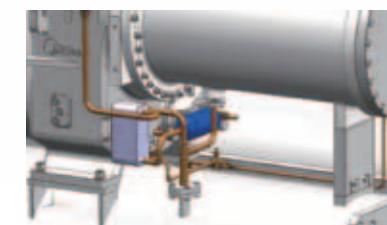
■ Reliable Lubricant System

The lubrication system consists of an internal oil sump with oil heaters, positive displacement oil pump, brazed plate oil cooler, and oil return line. High position oil sump supply oil to the gear surface for lubrication, prevent the gear from burnt if sudden power loss happens.



■ External Oil Filter and Oil cooler

A plate type oil cooler is factory mounted aside the compressor. An external oil filter and oil cooler is easy to do maintenance and replacement. Change of the oil filter or oil cooler can be done after closed the isolation valve in the pipe line.



■ Unmatched Oil Reclaim System

During the running of chiller unit, a small amount of lube may interfuses into the refrigerant. Midea patented oil reclaim system designed to return the oil from the heat exchanger back to the oil tank. It will improve the refrigerant purity to increase the thermal exchange efficiency and provide sufficient oil to compressor.

■ Low Inrush Current

Standard starter for Midea centrifugal chiller is a popular type for centrifugal chiller applications, that's wye-delta starter. The motor windings first connect in a "wye" configuration to reduce the inrush current to 33.3% of locked rotor amps and producing 33.3% of normal starting torque. After a brief delay (transition time), the electrical load is momentarily transitioned to resistances while the motor windings are changed to the "delta" configuration. The resistances minimize the second inrush current when the delta configuration becomes active.

■ 100% Factory Run-Tested

In Midea factory, after assembled, the unit will 100% go through performance test in the test center. The benefits of a performance test include verification of performance, prevention of operational problems and assurance of a smooth start-up. A chiller that has been tested is operation and performance-proven.

SPECIFICATION

Item			Model	LC350M	LC400M	LC450M	LC500M	LC550M
Cooling capacity	RT		350	400	450	500	550	
	kW		1230	1406	1582	1758	1934	
	10 ⁴ kcal/h		105	120	136	151	166	
Evaporator	Chilled water flow volume	m³/h	210	242	272	302	332	
	Chilled water pressure drop	kPa	80	85	82	80	78	
	Pass	—	2					
	Fouling factor	m²·°C/kW	0.086					
	Water side design pressure	Mpa	1.0					
	Chilled water inlet/outlet temperature	°C	12/7					
	Water pipe inlet/outlet diameter	—	DN200	DN200	DN200	DN200	DN250	
Condenser	Cooling water flow volume	m³/h	256	292	327	362	397	
	Cooling water pressure drop	kPa	88	88	89	90	85	
	Pass	—	2					
	Fouling factor	m²·°C/kW	0.086					
	Water side design pressure	Mpa	1.0					
	Cooling water inlet/outlet temperature	°C	32/37					
	Water pipe inlet/outlet diameter	—	DN200	DN200	DN200	DN200	DN250	
Compressor	Running power	kW	230	262	293	313	345	
	Configured power	kW	300	300	385	385	385	
	Power supply	V-Ph-Hz	380—3-50					
	Rated Current(380V)	A	424	484	541	578	637	
	Starting Current (380V)	A	1199	1199	1538	1538	1538	
	Rated Current(10000V)	A	\	\	\	\	\	
	Starting Current(10000V)	A	\	\	\	\	\	
	Motor rotate speed	RPM	2960					
	Motor cooled by		Refrigerant					
Efficiency	—	kW/RT	0.657	0.655	0.651	0.626	0.627	
Weight	Shipping weight	kg	7205	7325	7510	7630	8365	
	Running weight	kg	8279	8438	8702	8938	9795	
	R134a Charge	kg	400	500	500	500	550	
Dimension	Length	mm	4671	4671	4671	4671	4725	
	Width	mm	1850	1850	1850	1850	1990	
	Height	mm	2054	2054	2054	2054	2162	

Notes:

1. Nominal Cooling capacities are based on following conditions:
Chilled water inlet/outlet temperature 12°C/7°C(53.6°F/44.6°F);Cooling water inlet/outlet temperature 32°C/37°C(89.6°F/98.6°F).
2. The design fouling factor for both evaporator and condenser are 0.086m²·°C/kW (0.0005ft2·°F-hr/Btu),otherwise can be customized.
3. The design working pressure for both evaporator and condenser are 1.0MPa, higher pressure demand can be customized.

Item			Model	LC600M	LC650M	LC700M	LC750M	LC800M
Cooling capacity	RT		600	650	700	750	800	
	kW		2110	2285	2461	2637	2814	
	10 ⁴ kcal/h		181	196	211	226	242	
Evaporator	Chilled water flow volume	m ³ /h	362	392	422	452	484	
	Chilled water pressure drop	kPa	82	90	86	92	90	
	Pass	—	2					
	Fouling factor	m ² · °C/kW	0.086					
	Water side design pressure	Mpa	1.0					
	Chilled water inlet/outlet temperature	°C	12/7					
	Water pipe inlet/outlet diameter	—	DN250	DN250	DN250	DN250	DN300	
Condenser	Cooling water flow volume	m ³ /h	433	466	501	537	575	
	Cooling water pressure drop	kPa	88	92	93	92	89	
	Pass	—	2					
	Fouling factor	m ² · °C/kW	0.086					
	Water side design pressure	Mpa	1.0					
	Cooling water inlet/outlet temperature	°C	32/37					
	Water pipe inlet/outlet diameter	—	DN250	DN250	DN250	DN250	DN300	
Compressor	Running power	kW	376	406	437	470	500	
	Configured power	kW	445	490	490	560	560	
	Power supply	V-Ph-Hz	380—3-50	380/6000/10000—3-50				
	Rated Current(380V)	A	694	741	798	858	913	
	Starting Current (380V)	A	1778	1947	1947	2225	2225	
	Rated Current(10000V)	A	\	29	31	33	35	
	Starting Current(10000V)	A	\	256	256	292	292	
	Motor rotate speed	RPM	2960					
	Motor cooled by		Refrigerant					
Efficiency	—	kW/RT	0.627	0.625	0.624	0.627	0.625	
Weight	Shipping weight	kg	8550	10890	10940	11170	11325	
	Running weight	kg	10046	12206	12399	12786	13020	
	R134a Charge	kg	550	660	680	680	740	
Dimension	Length	mm	4725	5077	5077	5077	5077	
	Width	mm	1990	2200	2200	2200	2300	
	Height	mm	2162	2540	2540	2540	2540	

Notes:

1. Nominal Cooling capacities are based on following conditions:
Chilled water inlet/outlet temperature 12°C/7°C(53.6°F/44.6°F);Cooling water inlet/outlet temperature 32°C/37°C(89.6°F/98.6°F).
- 2.The design fouling factor for both evaporator and condenser are 0.086m²·°C/kW (0.0005ft2·°F-hr/Btu),otherwise can be customized.
3. The design working pressure for both evaporator and condenser are 1.0MPa, higher pressure demand can be customized.

Item			Model	LC850M	LC900M	LC950M	LC1000M	LC1100M
Cooling capacity	RT		850	900	950	1000	1100	
	kW		2988	3165	3340	3510	3867	
	10 ⁴ kcal/h		257	272	287	302	332	
Evaporator	Chilled water flow volume	m³/h	514	544	574	604	664	
	Chilled water pressure drop	kPa	88	92	92	88	92	
	Pass	—	2					
	Fouling factor	m² · °C/kW	0.086					
	Water side design pressure	Mpa	1.0					
	Chilled water inlet/outlet temperature	℃	12/7					
	Water pipe inlet/outlet diameter	—	DN300	DN300	DN300	DN300	DN300	
Condenser	Cooling water flow volume	m³/h	611	645	680	719	789	
	Cooling water pressure drop	kPa	95	92	88	92	91	
	Pass	—	2					
	Fouling factor	m² · °C/kW	0.086					
	Water side design pressure	Mpa	1.0					
	Cooling water inlet/outlet temperature	℃	32/37					
	Water pipe inlet/outlet diameter	—	DN300	DN300	DN300	DN300	DN350	
Compressor	Running power	kW	532	563	595	623	679	
	Configured power	kW	630	630	695	695	760	
	Power supply	V-Ph-Hz	380/6000/10000–3-50					
	Rated Current(380V)	A	966	1022	1081	1131	1233	
	Starting Current (380V)	A	2503	2503	2761	2761	3020	
	Rated Current(10000V)	A	38	40	42	44	48	
	Starting Current(10000V)	A	329	329	363	363	378	
	Motor rotate speed	RPM	2960					
	Motor cooled by		Refrigerant					
Efficiency	—	kW/RT	0.626	0.626	0.626	0.623	0.617	
Weight	Shipping weight	kg	11685	11830	14160	14330	14480	
	Running weight	kg	13681	13868	16532	16652	16832	
	R134a Charge	mm	790	790	820	820	900	
Dimension	Length	mm	5077	5077	5160	5160	5160	
	Width	mm	2300	2300	2500	2500	2500	
	Height		2540	2540	2625	2625	2625	

Notes:

- Nominal Cooling capacities are based on following conditions:
Chilled water inlet/outlet temperature 12°C/7°C(53.6°F/44.6°F);Cooling water inlet/outlet temperature 32°C/37°C(89.6°F/98.6°F).
- The design fouling factor for both evaporator and condenser are 0.086m² · °C/kW (0.0005ft2 · °F-hr/Btu),otherwise can be customized.
- The design working pressure for both evaporator and condenser are 1.0MPa, higher pressure demand can be customized.

Item			Model	LC1200M	LC1300M	LC1400M	LC1500M	LC1600M	LC1700M
Cooling capacity	RT			1200	1300	1400	1500	1600	1700
	kW			4220	4572	4924	5276	5627	5978
	10 ⁴ kcal/h			363	393	423	454	484	514
Evaporator	Chilled water flow volume	m³/h	726	786	847	907	968	1028	
	Chilled water pressure drop	kPa	95	102	115	120	118	120	
	Pass	—	2						
	Fouling factor	m²·℃/kW	0.086						
	Water side design pressure	Mpa	1.0						
	Chilled water inlet/outlet temperature	℃	12/7						
	Water pipe inlet/outlet diameter	—	DN300	DN350	DN350	DN350	DN400	DN400	
Condenser	Cooling water flow volume	m³/h	862	926	992	1063	1135	1204	
	Cooling water pressure drop	kPa	96	94	105	108	115	112	
	Pass	—	2						
	Fouling factor	m²·℃/kW	0.086						
	Water side design pressure	Mpa	1.0						
	Cooling water inlet/outlet temperature	℃	32/37						
	Water pipe inlet/outlet diameter	—	DN350	DN350	DN350	DN350	DN400	DN400	
Compressor	Running power	kW	750	815	870	930	990	1050	
	Configured power	kW	840	840	990	990	1100	1100	
	Power supply	V-Ph-Hz	380/6000/10000—3-50		6000/10000—3-50		6000/10000—3-50		
	Rated Current(380V)	A	1362	1456	\	\	\	\	
	Starting Current (380V)	A	3337	3337	\	\	\	\	
	Rated Current(10000V)	A	53	57	61	65	69	72	
	Starting Current(10000V)	A	418	418	466	466	518	518	
	Motor rotate speed	RPM	2960						
	Motor cooled by		Refrigerant						
Efficiency	—	kW/RT	0.625	0.627	0.621	0.620	0.619	0.618	
Weight	Shipping weight	kg	14600	16180	17737	18189	19218	19453	
	Running weight	kg	17480	18250	20203	20424	22363	23485	
	R134a Charge	kg	1050	1260	1310	1400	1420	1470	
Dimension	Length	mm	5160	5189	5540	5540	5540	5590	
	Width	mm	2500	2700	2700	2700	2700	2880	
	Height	mm	2625	2780	2880	2880	2880	3030	

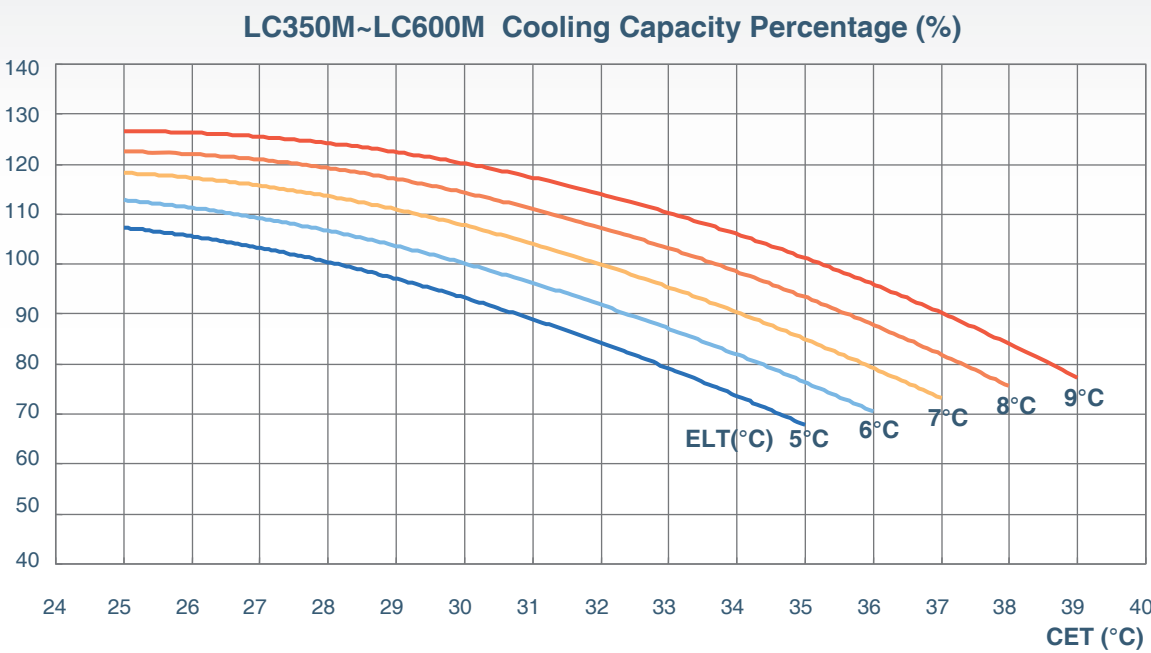
Notes:

- Nominal Cooling capacities are based on following conditions:
Chilled water inlet/outlet temperature 12°C/7°C(53.6°F/44.6°F);Cooling water inlet/outlet temperature 32°C/37°C(89.6°F/98.6°F).
- The design fouling factor for both evaporator and condenser are 0.086m² · °C/kW (0.0005ft2 · °F-hr/Btu),otherwise can be customized.
- The design working pressure for both evaporator and condenser are 1.0MPa, higher pressure demand can be customized.

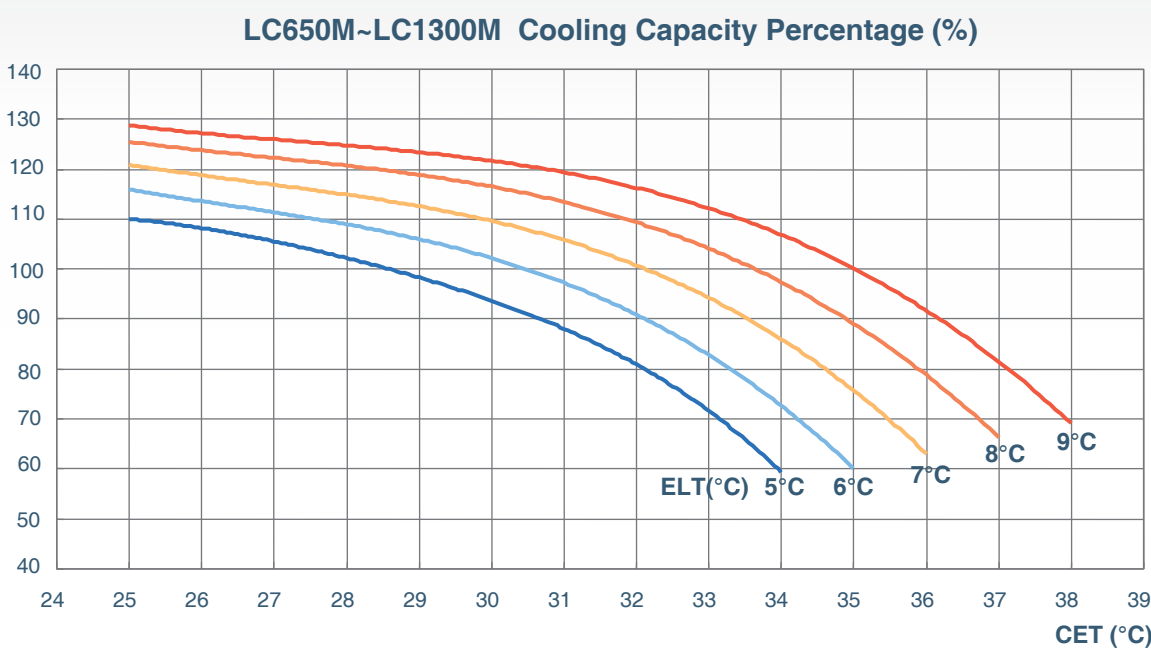
Item			Model	LC1200MS	LC1350MS	LC1500MS	LC1650MS	LC1800MS	LC1900MS	LC2000MS
Cooling capacity	RT			1200	1350	1500	1650	1800	1900	2000
	kW			4220	4745	5275	5800	6330	6680	7030
	10 ⁴ kcal/h			365	410	455	500	545	575	605
Evaporator	Chilled water flow volume	m³/h	726	816	907	998	1089	1150	1210	
	Chilled water pressure drop	kPa	102	105	105	106	108	108	110	
	Pass	—	2							
	Fouling factor	m²·°C/kW	0.086							
	Water side design pressure	Mpa	1.0							
	Chilled water inlet/outlet temperature	°C	12/7							
	Water pipe inlet/outlet diameter	—	DN350	DN350	DN350	DN400	DN400	DN400	DN400	
Condenser	Cooling water flow volume	m³/h	853	959	1066	1172	1279	1350	1421	
	Cooling water pressure drop	kPa	98	104	104	103	114	107	110	
	Pass	—	2							
	Fouling factor	m²·°C/kW	0.086							
	Water side design pressure	Mpa	1.0							
	Cooling water inlet/outlet temperature	°C	32/37							
	Water pipe inlet/outlet diameter	—	DN350	DN350	DN350	DN400	DN400	DN400	DN400	
Compressor	Running power	kW	740	830	922	1014	1108	1168	1228	
	Configured power	kW	840	875	970	1070	1170	1230	1290	
	Power supply	V-Ph-Hz	10000—3-50							
	Rated Current(10000V)	A	52	58	64	71	77	82	86	
	Starting Current(10000V)	A	383	399	427	471	515	542	568	
	Motor rotate speed	RPM	2960							
	Motor cooled by		Refrigerant							
Efficiency	—	kW/RT	0.617	0.615	0.615	0.615	0.616	0.615	0.614	
Weight	Shipping weight	kg	22160	23050	23500	24100	27050	27320	27600	
	Running weight	kg	23250	25100	25750	26150	28800	29400	29800	
	R134a Charge	kg	1100	1200	1500	1751	1905	1920	1960	
Dimension	Length	mm	5460	5540	5540	5540	5780	5780	5780	
	Width	mm	2600	2900	2900	2900	3150	3150	3150	
	Height	mm	2780	3000	3000	3000	3140	3140	3140	

- Notes:**
- Nominal Cooling capacities are based on following conditions:
Chilled water inlet/outlet temperature 12°C/7°C(53.6°F/44.6°F);Cooling water inlet/outlet temperature 32°C/37°C(89.6°F/98.6°F).
 - The design fouling factor for both evaporator and condenser are 0.086m²·°C/kW (0.0005ft²·°F·hr/Btu),otherwise can be customized.
 - The design working pressure for both evaporator and condenser are 1.0MPa, higher pressure demand can be customized.

PERFORMANCE CURVE



Note: CET=condenser entering temperature, ELT=evaporator leaving temperature.



Note: CET=condenser entering temperature, ELT=evaporator leaving temperature.



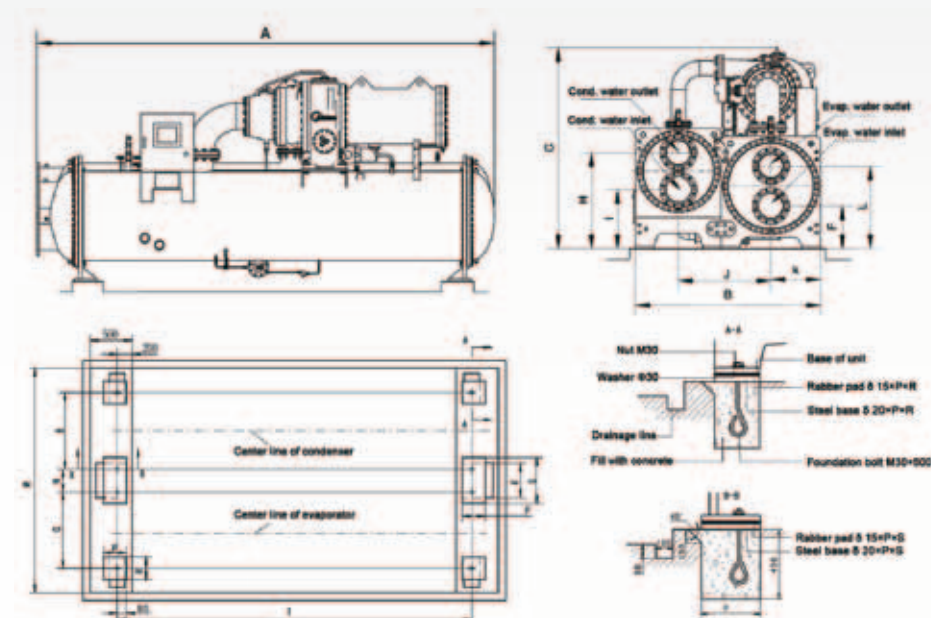
Note: CET=condenser entering temperature, ELT=evaporator leaving temperature.



Note: CET=condenser entering temperature, ELT=evaporator leaving temperature.

DIMENSION

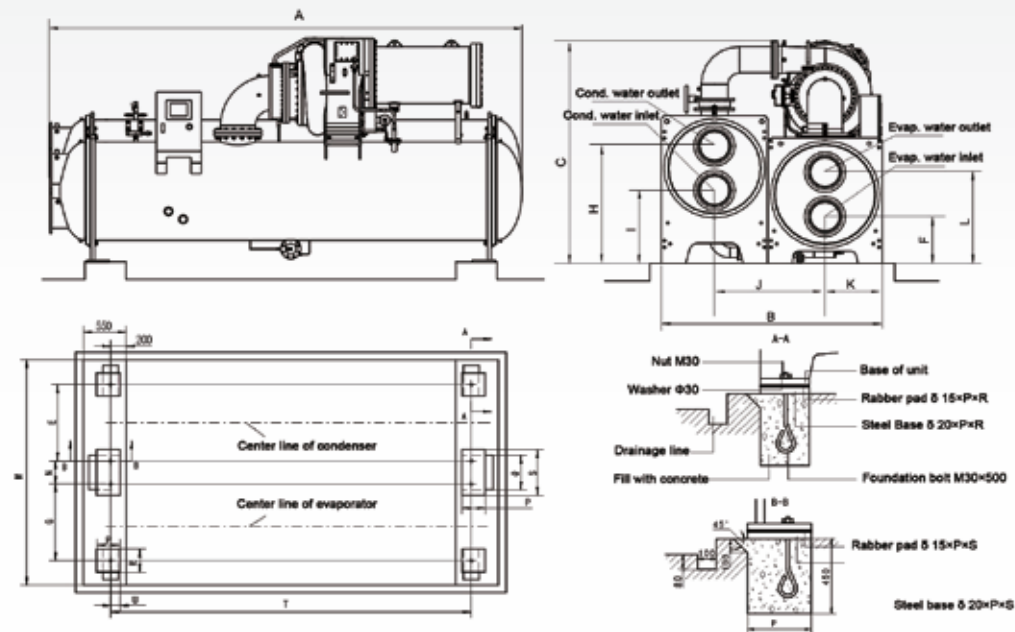
■ **LC350M-LC600M**



Model	Dimension			Unit Base								
	A	B	C	M	G	E	N	P	R	Q	S	T
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
LC350M	4673	1850	2019	2150	780	670	200	240	200	350	400	3780
LC400M												
LC450M												
LC500M												
LC550M	4730	1990	2127	2290	870	720	200	240	200	350	400	3780
LC600M												

Model	Pipe Locate Position							
	F	L	K	I	H	J	Evaporator	Condenser
	mm	mm	mm	mm	mm	mm	Diameter	Diameter
LC350M	410	820	490	650	1020	925	DN200	DN200
LC400M								
LC450M	410	820	490	650	1020	925	DN200	DN200
LC500M								
LC550M	460	890	535	635	1035	995	DN250	DN250
LC600M								

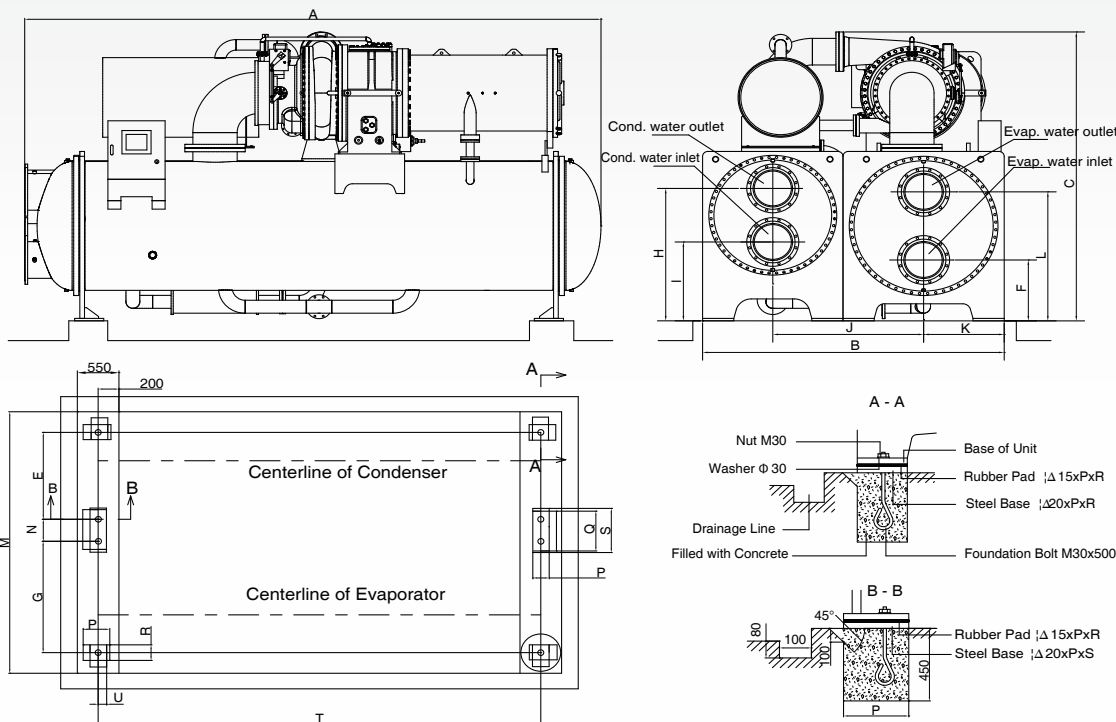
■ LC650M-LC1700M



Model	Dimension			Unit Base									
	A	B	C	M	G	E	N	P	R	Q	S	U	T
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
LC650M	5077	2250	2540	2500	1000	800	200	240	200	350	400	80	4080
LC700M													
LC750M													
LC800M													
LC850M	5077	2300	2540	2600	1000	900	200	240	200	350	400	80	4080
LC900M													
LC950M													
LC1000M													
LC1100M	5160	2500	2625	2800	1100	1000	200	240	200	350	400	80	4080
LC1200M													
LC1300M													
LC1400M													
LC1500M	5189	2700	2780	3040	1100	1000	300	300	300	450	600	100	4040
LC1600M													
LC1700M													

Model	Pipe Locate Position							
	F	L	K	I	H	J	Evaporator	Condenser
	mm	mm	mm	mm	mm	mm	Diameter	Diameter
LC650M	550	1050	600	735	1205	1100	DN250	DN250
LC700M								
LC750M								
LC800M								
LC850M	550	1050	600	785	1255	1150	DN300	DN300
LC900M								
LC950M								
LC1000M								
LC1100M	560	1110	650	885	1425	1250	DN300	DN300
LC1200M								
LC1300M								
LC1400M								
LC1500M	605	1155	700	930	1480	1350	DN350	DN350
LC1600M								
LC1700M								

■ LC1200MS-LC2000MS

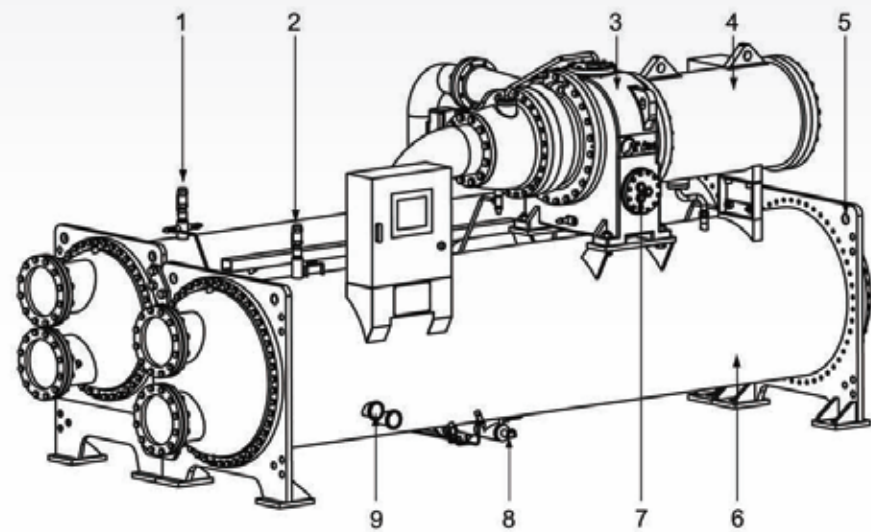


Model	Dimension			Unit Base									
	A	B	C	M	G	E	N	P	R	Q	S	U	T
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
LC1200MS	5460	2600	2780	2700	1150	1050	300	280	300	450	600	100	4340
LC1350MS	5540	2900	3000	3200	1250	1050	300	280	300	450	600	100	4340
LC1500MS	5540	2900	3000	3200	1250	1050	300	280	300	450	600	100	4340
LC1650MS	5540	2900	3000	3200	1250	1050	300	280	300	450	600	100	4340
LC1800MS	5790	3150	3140	3450	1380	1170	300	280	300	450	600	100	4540
LC1900MS	5790	3150	3140	3450	1380	1170	300	280	300	450	600	100	4540
LC2000MS	5790	3150	3140	3450	1380	1170	300	280	300	450	600	100	4540

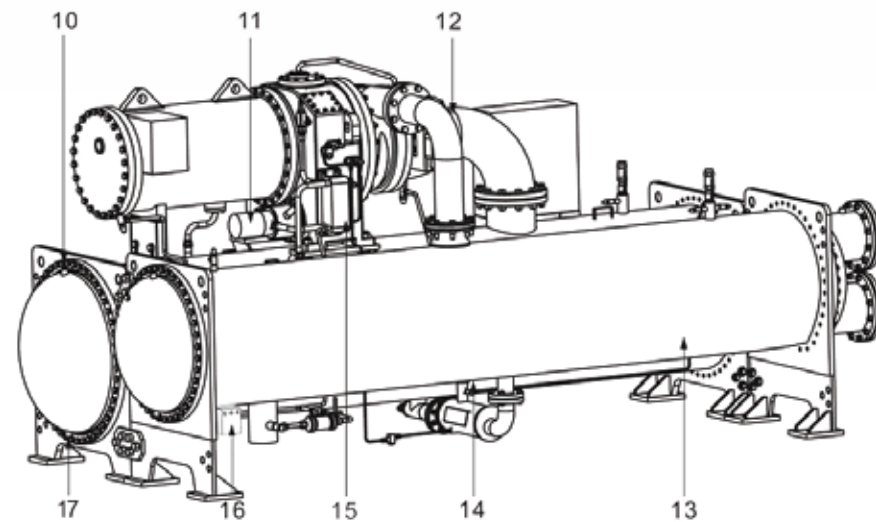
Model	Pipe Locate Position							
	F	L	K	I	H	J	Evaporator	Condenser
	mm	mm	mm	mm	mm	mm	Diameter	Diameter
LC1200MS	605	1155	655	1195	675	1300	DN350	DN350
LC1350MS	625	1325	810	1360	775	1450	DN350	DN350
LC1500MS	625	1325	810	1360	775	1450	DN350	DN350
LC1650MS	625	1325	795	1375	775	1450	DN400	DN400
LC1800MS	740	1440	790	1410	840	1585	DN400	DN400
LC1900MS	740	1440	790	1410	840	1585	DN400	DN400
LC2000MS	740	1440	790	1410	840	1585	DN400	DN400

CONSTRUCTION

■ LC350M- LC600M



Front View

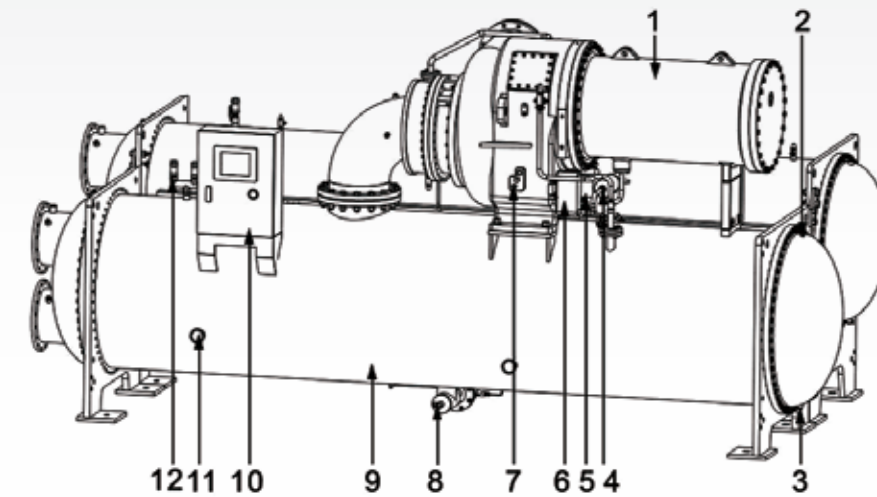


Rear View

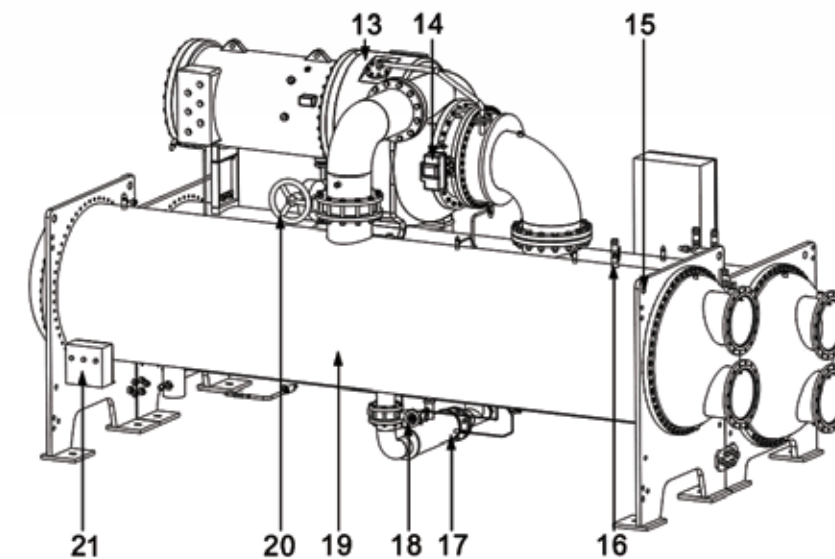
1. Condenser Security Valve
2. Evaporator Security Valve
3. Compressor
4. Motor
5. Lifting Points
6. Evaporator
7. Oil Level Sight Glass
8. Refrigerant Charge valve
9. Refrigerant Level Sight Glass

10. Air Release Valve
11. Oil Pump
12. Guide Vane Actuator
13. Condenser
14. Oil Reclaim Device
15. Oil Cooler
16. Oil Pump Starter
17. Water Drainage Valve

■ LC650M- LC1700M



Front View

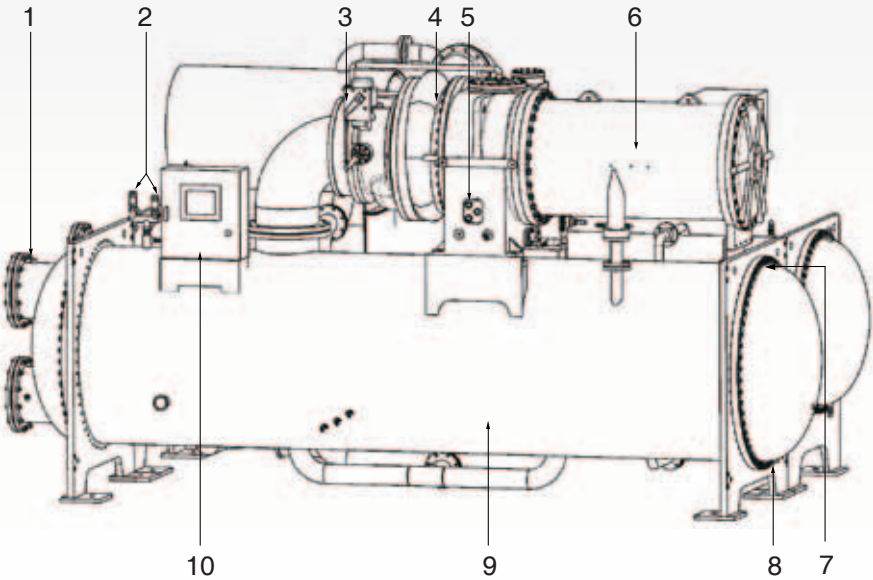


Rear View

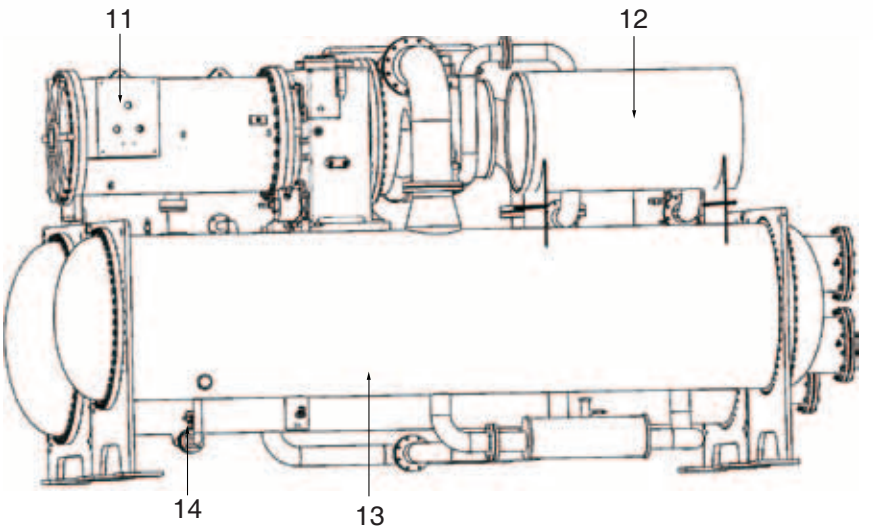
1. Motor
2. Air Release Valve
3. Water Drainage Valve
4. Oil Filter
5. Oil pump
6. Oil Cooler
7. Oil Level Sight Glass
8. Refrigerant Charge valve
9. Evaporator
10. Control Panel
11. Refrigerant Level Sight Glass

12. Evaporator Security Valve
13. Compressor
14. Guide Vane Actuator
15. Lifting Points
16. Condenser Security Valve
17. Oil Reclaim Device
18. Liquid Line Butterfly Valve (Optional)
19. Condenser
20. Discharge Line Butterfly Valve (Optional)
21. Oil Pump Starter

■ LC1200MS-LC2000MS



Front View



Rear View

1. Water outlet/inlet temperature sensor

2. Security Valve

3. Guide Vane Actuator

4. Compressor

5. Oil level Sight Glass

6. Motor

7. Air Release Valve
8. Water Drainage Valve

9. Evaporator

10. Control Panel

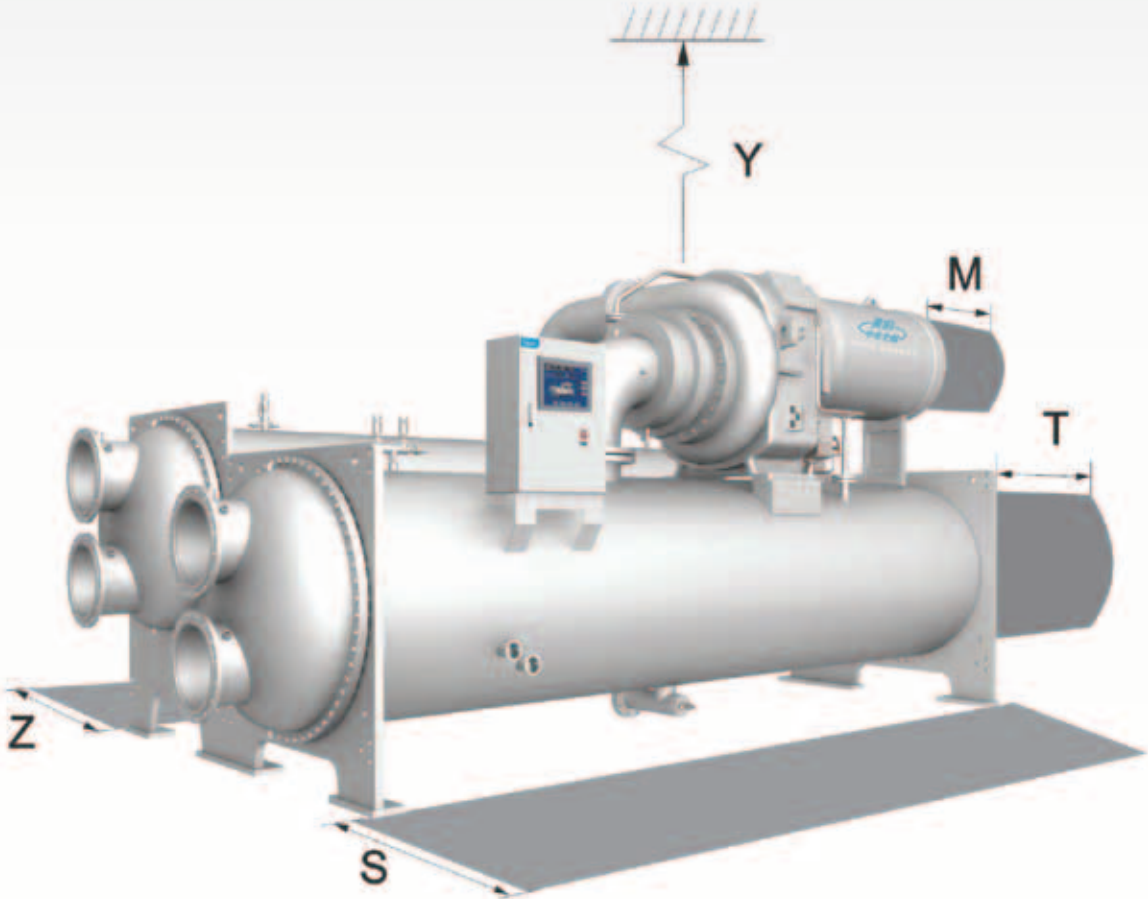
11. Motor Connection Box

12. Economizer

13. Condenser

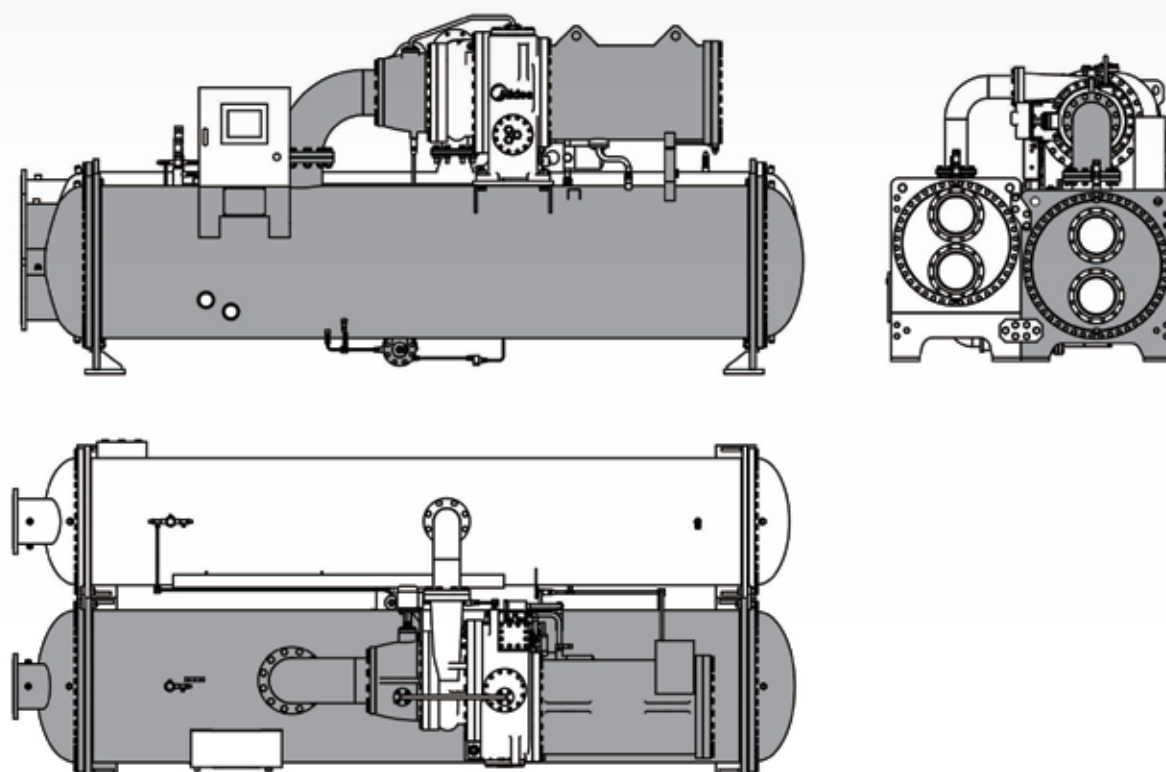
14. Electric Valve

SERVICE SPACE



Model	Service Space(mm)				
	M	T	Y	S	Z
LC350M~LC600M	1100	4200	1200	1200	1000
LC650M~LC1300M	1500	4500	1300	1300	1000
LC1400M~LC1700M	1500	5300	1300	1300	1000
LC1200MS~LC2000MS	1500	5300	1300	1300	1000

INSULATION

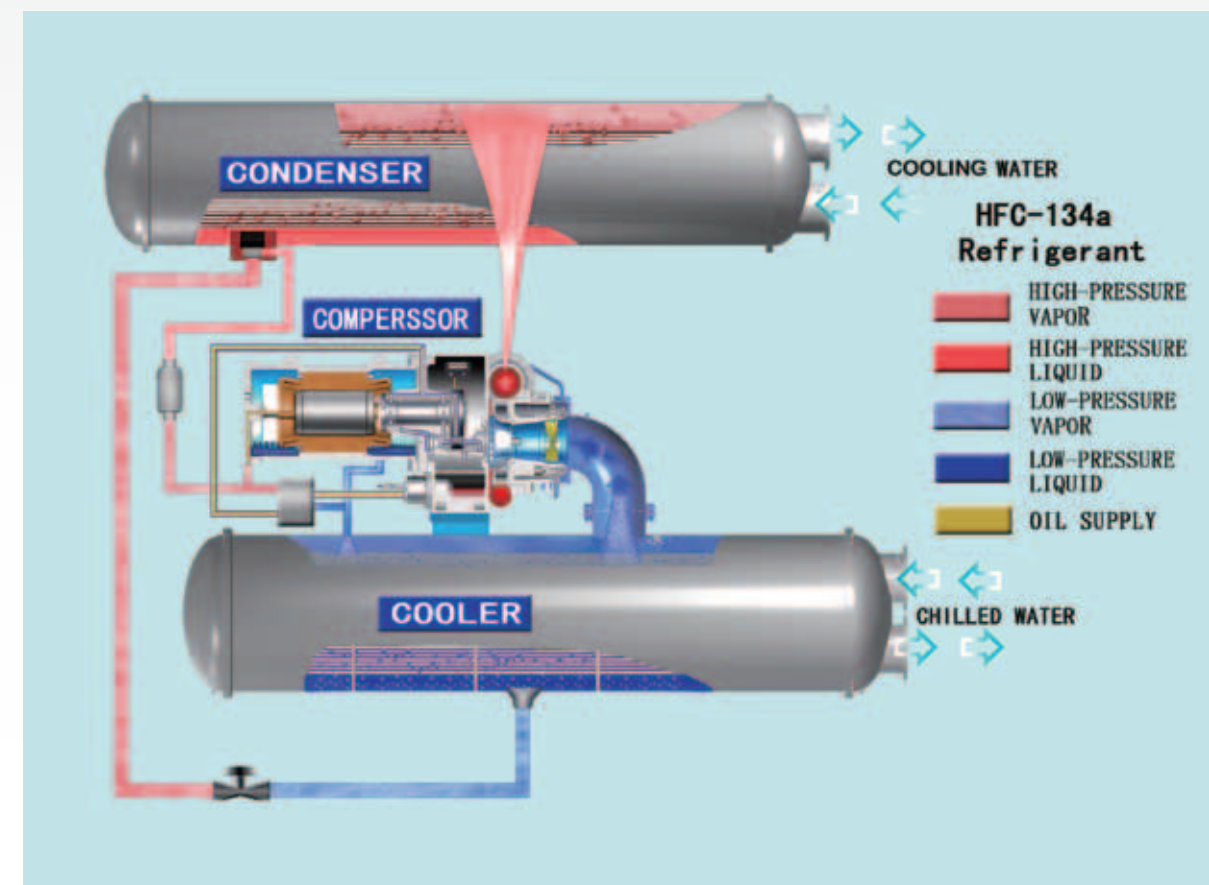


Note:

The gray area need to be insulated. Normally the chiller is insulated in the factory. If the chiller has to be insulated in the jobsite, it must ensure that:

- Moveable components and parts shouldn't be affected by insulation.
- Please don't leave connecting bolt in insulation.
- Please don't leave name plate in insulation.
- Please open water box cover when clean the evaporator tubes.

REFRIGERATION CYCLE



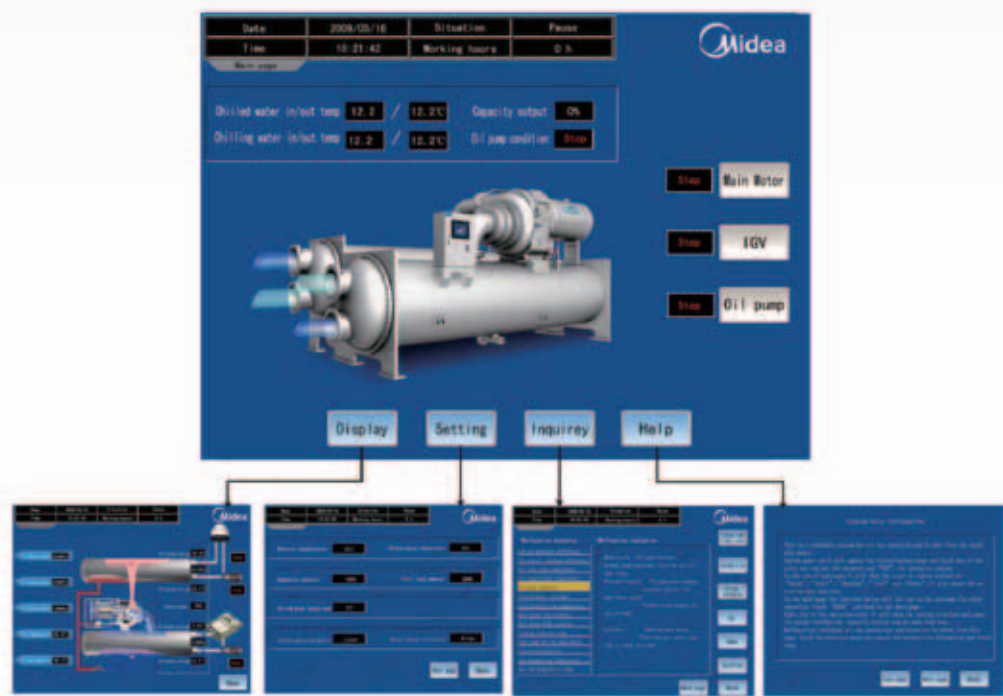
Refrigeration system

Midea LC centrifugal chiller is the steam-compressing cycle type. The refrigerant will be imposed vertical energy by the high speed impeller to increase its temperature and pressure. The high pressure and temperature refrigerant gas will release its thermal energy to the cooling water in condenser, thus decrease its temperature. After throttled by the orifice its pressure will be decreased dramatically. In evaporator the low temperature and low pressure refrigerant will absorb the thermal energy from the chilled water to evaporating. The low temperature chilled water produced in this refrigeration circulation. One refrigeration circulation includes four indispensable processes: compressing, condensing, throttling and evaporating.

MICROPROCESSOR CONTROL

■ Microprocessor control

Professional designed microprocessor controller combine with state-of-the-art control logic provide the safety, capacity control, interlock, and indications necessary to operate the chiller in a safe and efficient performance. The microprocessor control in Midea centrifugal system is factory mounted, wired, and tested to ensure machine operation in a proper condition and meets the programmed control logic.

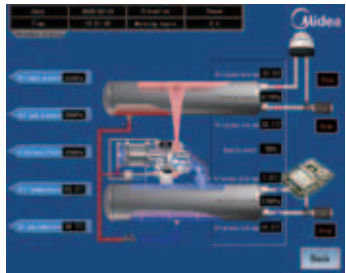


■ Control system

- Touchable screen, graphical display and convenient operation
- Menu-driven keypad interface
- Component test and diagnostic function
- Programmable Logic Controller, optimize performance
- Display operation parameters
- Real time monitoring function
- Precise pressure and temperature control
- More than 30 items of protections and alarms
- Languages pre-programmed at factory for English, Chinese
- Precise design and compact layout
- Modular construction easy for maintenance
- RS485 compatible, maximum 32 chillers and accessory equipments can be centralized

■ Basic Indication Items

- Chilled water inlet temperature
- Chilled water outlet temperature
- Cooling water inlet temperature
- Cooling water outlet temperature
- Condensing pressure
- Evaporating pressure
- Oil supply temperature
- Oil supply pressure
- Oil sump temperature
- Oil sump pressure
- Oil supply pressure difference
- Inlet guide vane opening
- Running current (percentage)
- Total power on time
- Total running time
- Total start-up time



■ Safety Cutouts

The all protection control, if necessary, shuts the chiller off or limits the open of inlet guide vane to protect the chiller from possible damage.

- Inadequate oil supply pressure difference.
- Excessive oil supply temperature
- Inadequate oil sump temperature
- Oil pump current overload
- Inadequate chilled water flow
- Low chilled water outlet temperature
- Compressor motor current overload
- Excessive main motor winding temperature
- Excessive Start time
- Inadequate evaporation pressure
- Excessive condensing pressure
- Temperature transmitter faults
- Pressure transmitter faults
- Starter faults
- Phase unbalance, phase loss, phase reversal
- Under voltage
- Over voltage

■ User Settings

- Restart temperature
- Pause temperature
- Current limit
- Full load/rated load
- Chilled water outlet temperature
- Rated motor currency
- System control mode
- Low oil supply pressure difference (before start)
- Low oil supply pressure difference (after start)
- Minimum oil supply pressure difference.
- Minimum oil sump temperature
- High oil supply temperature
- Maximum oil supply temperature
- Low evaporation pressure
- Minimum evaporation pressure
- High condensing temperature
- Maximum condensing temperature
- Low chilled water outlet temperature
- Critical inlet guide vane opening
- Critical water temperature

Note:Setting values refer to user manual



■ Capacity Control

- Minimum IGV opening control
- Maximum main motor current control
- Leaving chilled water temperature control
- Inlet guide vane actuator
- Manual mode option

STANDARD PROTECTION

■ **Low Supply Oil-pressure Difference Protection**

Oil pressure is indication of oil flow and oil-pump operation. A significant drop in oil pressure difference indicates a failure of the oil pump, oil leakage, or other blockage in the oil-circuit. The differential pressure during compressor pre-lube mode should not fall below set point. A failure on meets this requirement leads to inhibit the start of the chiller. When the compressor is running, an alarm will be displayed if the differential pressure is below set point. And if this value decreases to the minimum set point the chiller will shut-down.

■ **Oil-Temperature Protection**

High oil temperature when the oil pump and/or compressor are running may be an indication of oil-cooler failure, overheating of the oil and the bearings, or oil filter blockage. If the oil temperature continuous increase to the maximum set point, the chiller will shut-down. The start of the compressor will be inhibited if the oil sump temperature is below the set point. The diagnostic will display at the user interface.

■ **Oil Pump Current Overload Protection**

The oil pump control panel will monitor the current of oil pump, and shut the chiller off when the oil pump current exceeds its maximum set point.

■ **High Condenser-Pressure Protection**

The chiller controller’s algorithm keeps the condenser pressure under a specified maximum pressure. The chiller can run up to 100 percent of this setpoint in a safe and reliable condition. If the condenser pressure exceeds the set point, the system will prohibit the open of the inlet guide vane to decrease the pressure or shut off the chiller immediately according to the different set point.

■ **Low Evaporator-Pressure Protection**

The chiller controller’s algorithm keeps the evaporator pressure under a specified minimum pressure. The chiller can run up to 100 percent of this setpoint in a safe and reliable status. If the evaporator pressure decreases below the set point, the system will prohibit the open of the inlet guide vane to increase the pressure or shut off the chiller immediately according to the different set point.

■ **Water Flow Protection**

The water flow switches is required to install in the water piping system. The chiller controller has a digital input that will indicate the water flow. When this input does not prove flow within a fixed time during the starting, the process will be terminated. If the flow is lost while the chiller is in running, the system will shut the chiller off to protect the chiller from possible damage.

■ **Low Chilled Water Outlet Temperature Protection**

Low chilled water outlet temperature protection, also known as anti-freeze protection, avoids water freezing in the evaporator by immediately pause the chiller if the chilled water outlet temperature reaches its minimum allowable value. After the chilled water inlet temperature reach the restart set point, the chiller will start automatically. This protection may be due to the sensor fault, incorrect set point of chilled water outlet temperature or lack of chilled water flow.

■ **Current Overload Protection**

The control panel will monitor the current drawn by each line of the motor and if the highest of the three line currents exceeds 110% of the rated current, the system will close the inlet guide vane automatically and check whether the current decrease to normal condition. And the system will shut the chiller off if the highest of the three line currents exceeds 115% of the rated current. The current overload protection does not prohibit the chiller from reaching its full-load ampere.

■ **High Motor-Winding Temperature Protection**

This function monitors the motor temperature and terminates chiller operation when the temperature is excessive. The controller monitors the winding-temperature sensors any time the controller is energized. And immediately shut the chiller off if the temperature surpasses the maximum set point.

■ **Start Time Limit Protection**

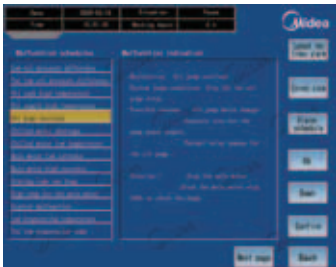
When start the chiller, if the time from Wye connection change to Delta connection exceeds set point. The system will shut the chiller off immediately to protect the chiller from possible damage.

■ **Power Supply Protection**

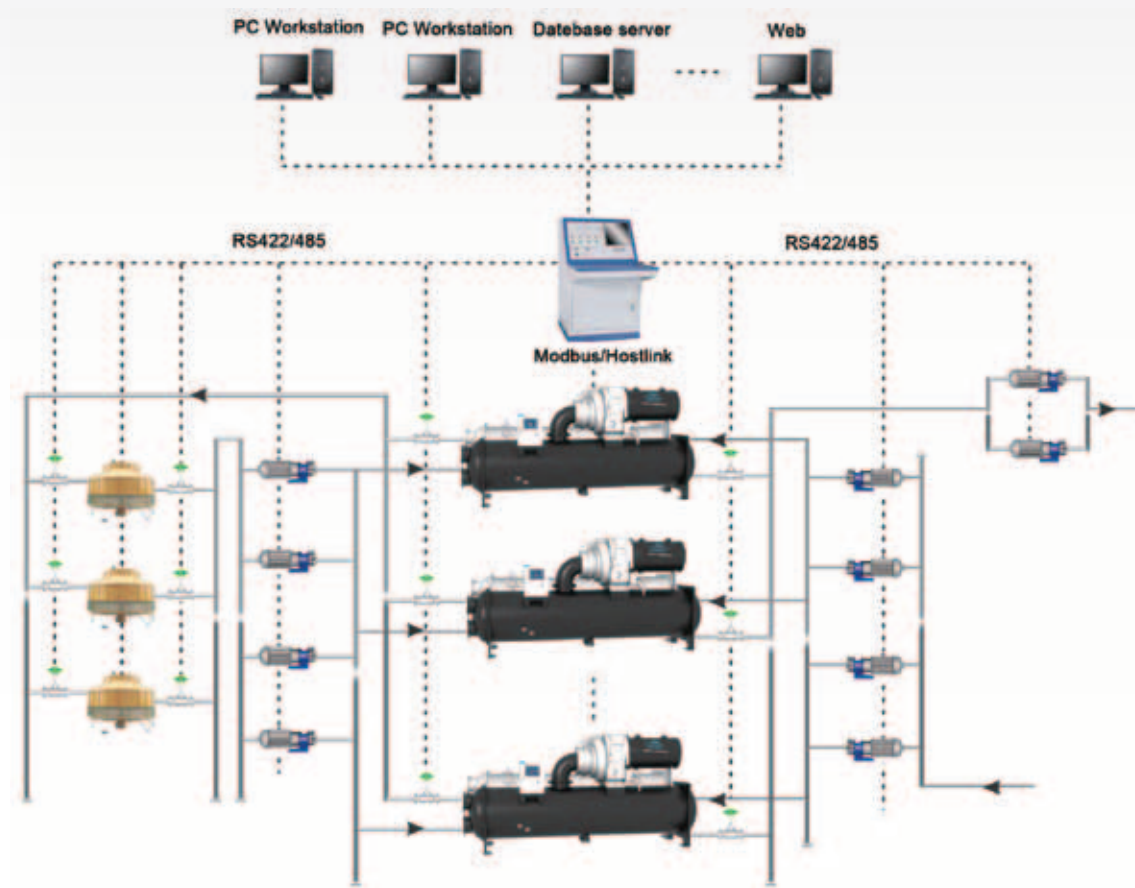
A factory installed transformer or power supply protection module in the starter, if any overvoltage or undervoltage, phase-unbalance, phase-loss, phase reversal happens, the control system will detect it and shut the chiller off in time.

■ **Starter Failure Protection**

The chiller will protect itself from a starter failure,that ensures the compressor motor disconnecting from the line when the motor reach the limits of its capabilities. The controller starts and stops the chiller through the starter. If the starter malfunctions and does not disconnect the compressor motor from the line in an emergency situation, the controller will recognize the fault and shut the chiller off immediately.



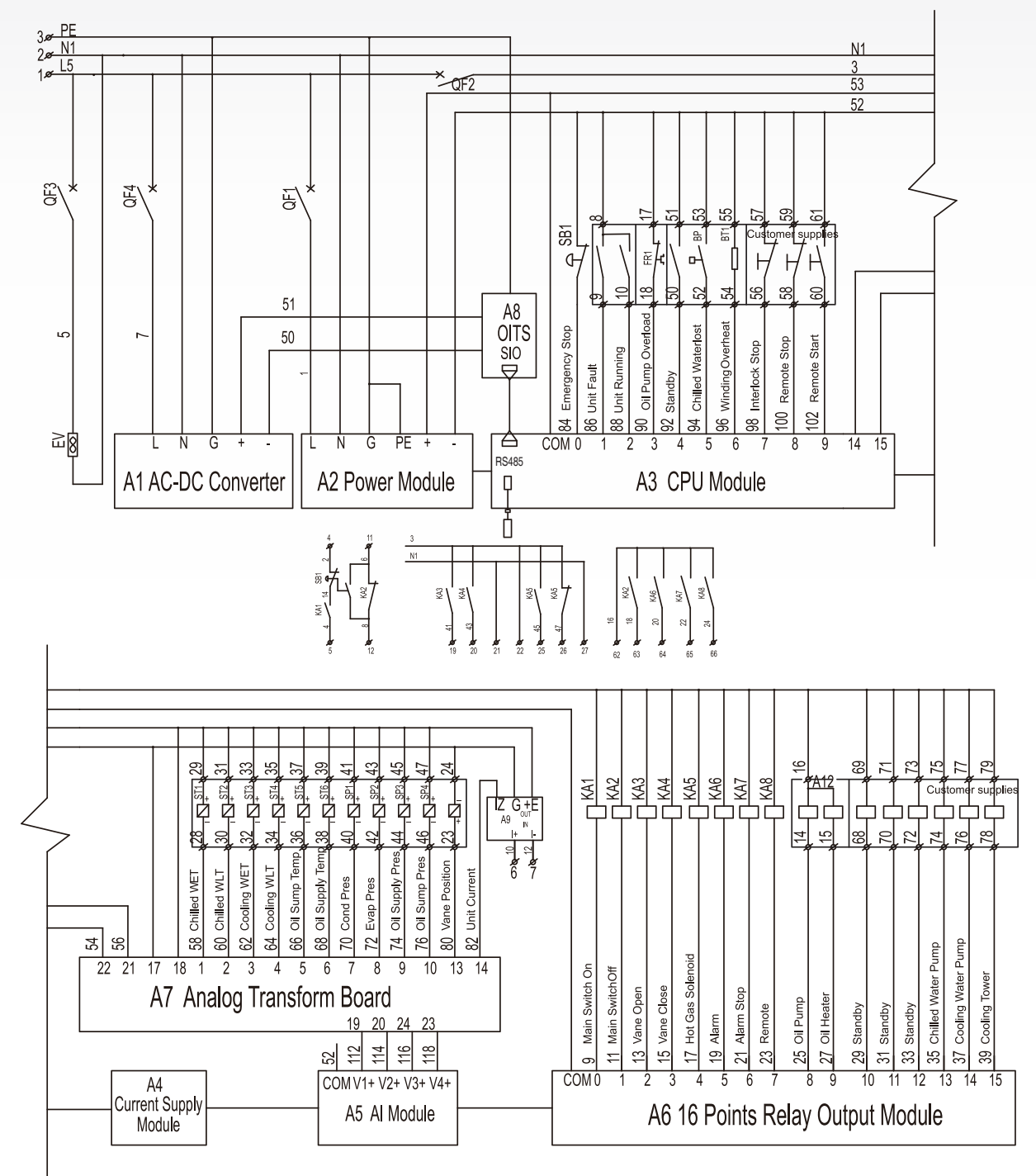
CENTRALIZED CONTROL

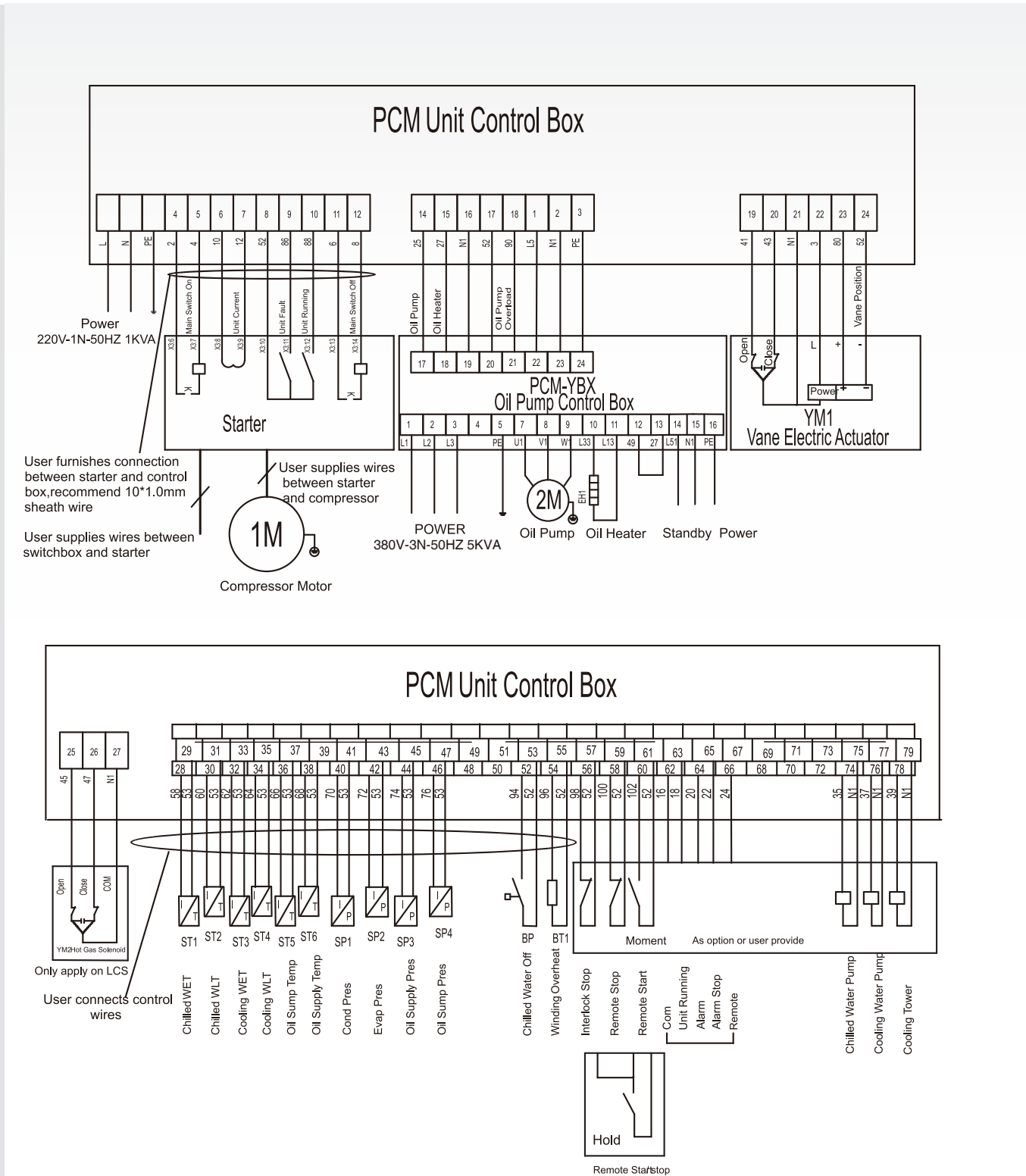


The chillers realize the centralized control by using the RS422/RS484 communication port and the DDC control panel. Maximum 32 chillers can be centralized integrate with the relevant cooling water pumps, chilled water pumps and cooling towers. It includes the reading and writing of data that allow system monitor, control and alarm as programmed. Also the system can be connected to the DCS/BAS/IBMS/SCADA and achieve remote control.

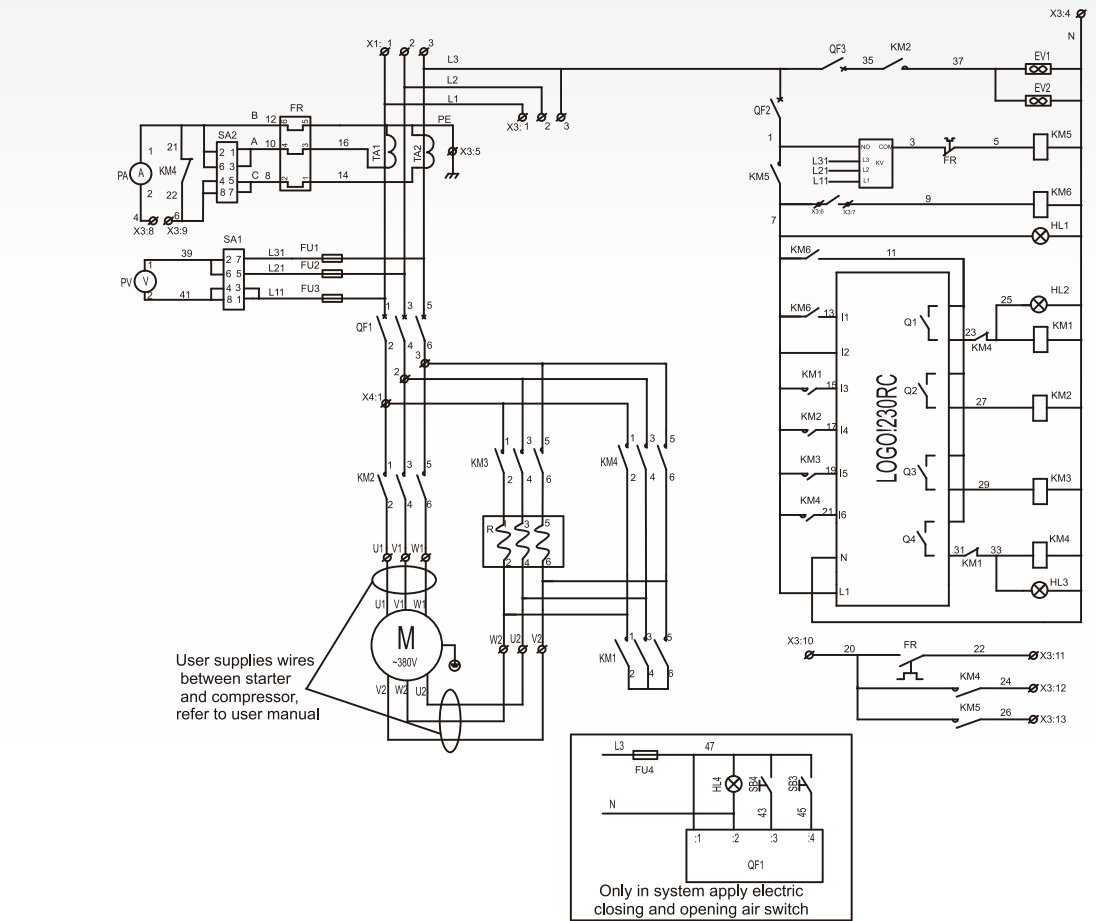
- Adjustment of chiller operation setpoints.
- Real time inspect and supervision of chiller operation state.
- Real time failure inspects.
- Historical operation data memory

TYPICAL WIRING DIAGRAM

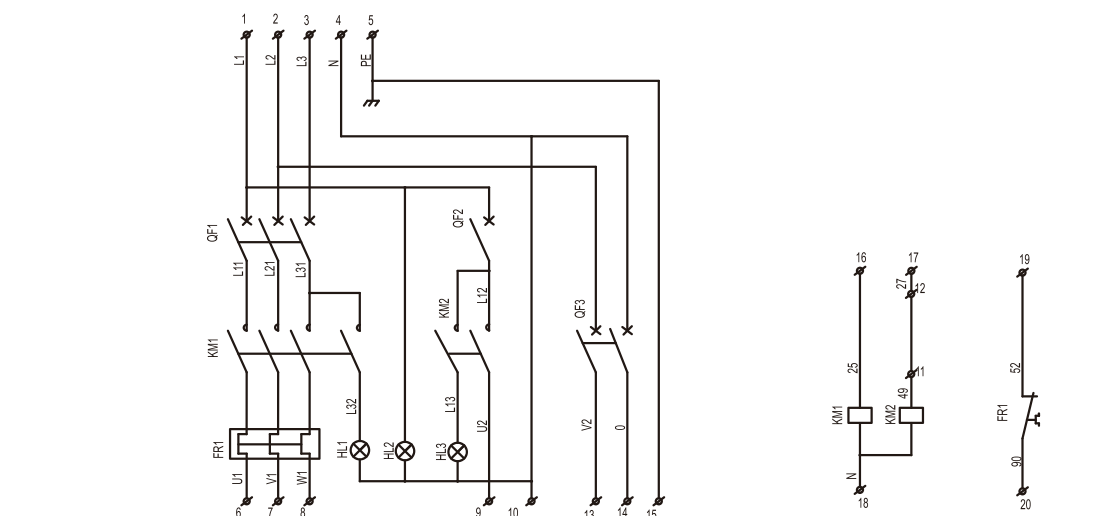




■ Starter Wiring Diagram (Typical)



■ Oil Pump Wiring Diagram (Typical)



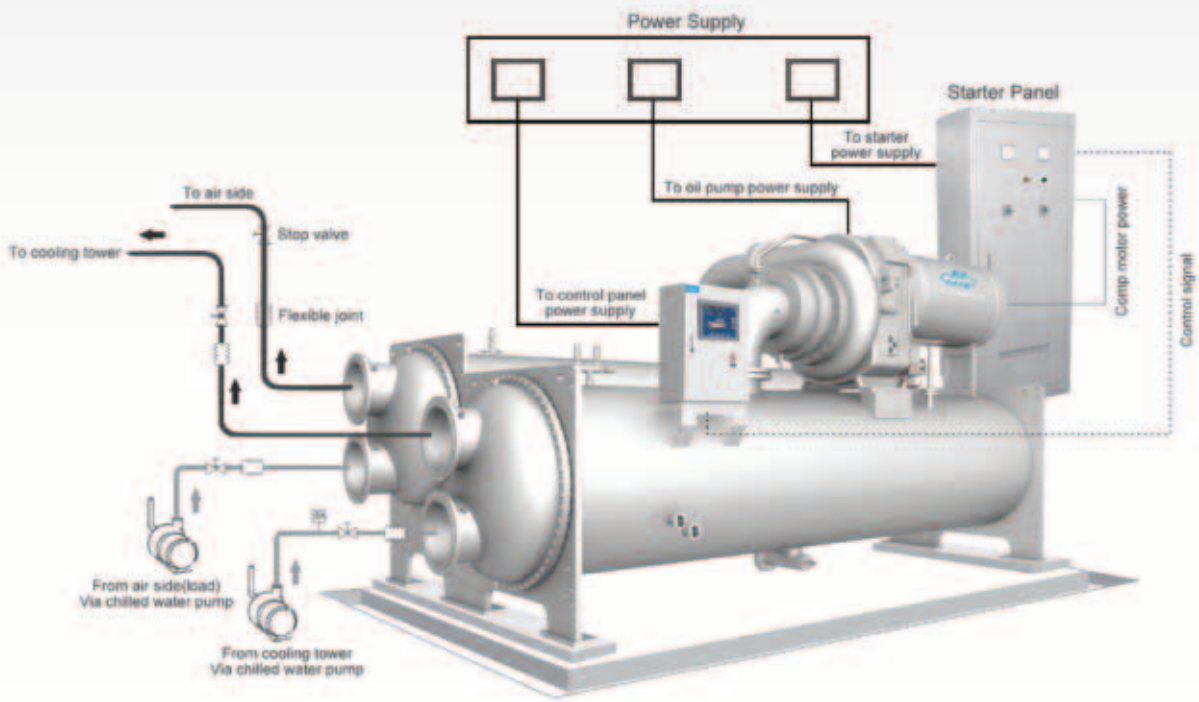
■ Recommended Cable Size

380V				High Voltage	
Model	Y-Δ Cable in	Y-Δ Cable out	Auto-transformer in/out	6kV	10kV
LC350M	2×BVR150	BVR185	2×BVR150	\	\
LC400M	2×BVR150	BVR185	2×BVR150	\	\
LC450M	2×BVR240	BVR300	2×BVR240	\	\
LC500M	2×BVR240	BVR300	2×BVR240	\	\
LC550M	2×BVR240	BVR300	2×BVR240	\	\
LC600M	2×BVR300	2×BVR120	2×BVR300	\	\
LC650M	2×BVR300	2×BVR150	2×BVR300	YJV ₂₂ 35	YJV ₂₂ 25
LC700M	2×BVR300	2×BVR150	2×BVR300	YJV ₂₂ 35	YJV ₂₂ 25
LC750M	3×BVR240	2×BVR185	3×BVR240	YJV ₂₂ 50	YJV ₂₂ 35
LC800M	3×BVR240	2×BVR185	3×BVR240	YJV ₂₂ 50	YJV ₂₂ 35
LC850M	3×BVR240	2×BVR240	3×BVR240	YJV ₂₂ 50	YJV ₂₂ 35
LC900M	3×BVR240	2×BVR240	3×BVR240	YJV ₂₂ 50	YJV ₂₂ 35
LC950M	3×BVR300	2×BVR240	3×BVR300	YJV ₂₂ 50	YJV ₂₂ 35
LC1000M	3×BVR300	2×BVR240	3×BVR300	YJV ₂₂ 50	YJV ₂₂ 35
LC1100M	4×BVR240	2×BVR300	4×BVR240	YJV ₂₂ 70	YJV ₂₂ 50
LC1200M	4×BVR240	2×BVR300	4×BVR240	YJV ₂₂ 70	YJV ₂₂ 50
LC1300M	4×BVR240	2×BVR300	4×BVR240	YJV ₂₂ 70	YJV ₂₂ 50
LC1400M	\	\	\	YJV ₂₂ 70	YJV ₂₂ 50
LC1500M	\	\	\	YJV ₂₂ 70	YJV ₂₂ 50
LC1600M	\	\	\	YJV ₂₂ 95	YJV ₂₂ 70
LC1700M	\	\	\	YJV ₂₂ 95	YJV ₂₂ 70
LC1200MS	\	\	\	YJV ₂₂ 70	YJV ₂₂ 50
LC1350MS	\	\	\	YJV ₂₂ 70	YJV ₂₂ 50
LC1500MS	\	\	\	YJV ₂₂ 70	YJV ₂₂ 50
LC1650MS	\	\	\	YJV ₂₂ 70	YJV ₂₂ 50
LC1800MS	\	\	\	YJV ₂₂ 95	YJV ₂₂ 70
LC1900MS	\	\	\	YJV ₂₂ 95	YJV ₂₂ 70
LC2000MS	\	\	\	YJV ₂₂ 95	YJV ₂₂ 70

NOTE:

- 1. The table listed the recommended cable cross section, mm².
- 2. Use copper cable only.
- 3. Application must in accordance with IEC standard and local or national regulations.

TYPICAL PIPING AND CABLE LAYOUT

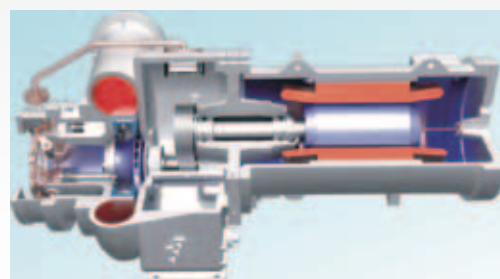


- Choose the proper power supply cable size and tag clearly.
- Filter must be used in the water system.
- Thermometer and pressure meter must be installed in the water system.
- Recommend to use a steel pipe to connect the security release valve to the outside.
- Recommend to use an oxygen density indicator that alarm automatically when the density lower than 19.5%.
- Cable and pipe layout should be done based on local regulation.

MECHANICAL SPECIFICATION

■ Compressor

Single-stage centrifugal compressor with high-strength aluminum alloy fully shrouded impellers and moveable inlet guide van. The enclosed type impeller is designed for balanced thrust and is dynamically balanced and overspeed tested for smooth, vibration free operation. Airfoil shaped inlet guide vane minimize flow disruption for the most efficient part load performance. The movement of the inlet guide vane is controlled by a mounted electric actuator in response to refrigeration load on the evaporator. The rotor assembly consists of a heat-treated alloy steel drive shaft with a high strength, and the high speed shaft is forged with high strength and reliability.



■ Motor

Midea centrifugal chiller use semi-hermetic two-pole motor and is cooled by the circular refrigerant, winding embedded sensors provide positive thermal protection to the motor. Asynchronism squirrel cage type motor can achieve higher operation performance and longer life span. Refrigerant cooled motor keeps motor heat out of the mechanical room, decrease vibration and shaft seal maintenance compare with open motors. Also refrigerant cooled motor have lower inrush currents and lower noise than open motor which cooled by air, there is no need to provide additional ventilation or air conditioning for the mechanical room than open motor design. The motor is bolt connected to the compressor gear housing and shaft labyrinth seal prevents refrigerant leakage from the motor to the gear box. Low voltage motor provides 6 terminals for reduce starting voltage (wye-delta or auto transformer start). High voltage motor provides three terminal posts for full voltage (across the line). Motor terminal pads are supplied. A moveable steel sheet terminal box encloses the terminal board area to insulation.



■ Impeller And Inlet Guide Vane

High strength aluminum-alloy compressor impellers feature backward-curved vanes for high efficiency Airfoil shaped inlet guide vane minimize flow disruption for the most efficient part load performance. Precisely positioned and tightly fitted, it allows the compressor to unload smoothly from 10% to 100% load output for excellent operation in real air conditioning application. The movement is controlled by a mounted electrical operator in response to refrigeration load on the evaporator. Impeller is made of high strength aluminum alloy which is tested at 125% design operating speed.



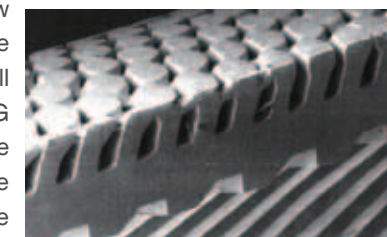
■ Heat Exchanger Tube

Heat exchanger tubes are high-efficiency, externally and internally enhanced type to provide optimum performance. Tubes in both the evaporator and condenser are 3/4" O.D. copper alloy providing an internal and external surface. This provides extra wall thickness (up to twice as thick) and non-work hardened copper at the support location, extending the life span of the heat exchanger. Each tube is roller expanded into the tube sheets providing a leakproof seal, and is individually replaceable. Copper alloy material as a standard choice and 90/10 copper-nickel, 304stainless steel or titanium material can be customized.



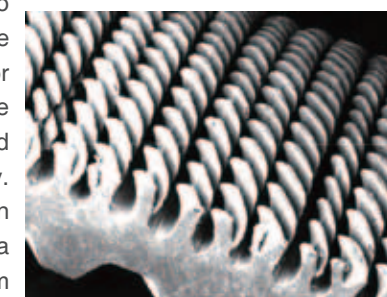
■ Evaporator

The evaporator is a shell and tube type heat exchanger. A flow equalizer provides uniform distribution of refrigerant over the entire tube length to yield optimum heat transfer. The evaporator shell contains a dual refrigerant relief valve arrangement set at 185 PSIG (1280 kPa) or single-relief valve arrangement. Intermediate tube support sheets positioned along the shell axis prevent relative tube motion. The waterside is hydraulic tested at 1.5 times of the maximum working pressure.



■ Condenser

The condenser is shell and tube type, with discharge gas baffle to prevent direct high velocity gas impingement on the tubes. The baffle is also used to distribute the refrigerant gas flow properly for most efficient heat transfer. An integral sub-cooler is located at the bottom of the condenser shell providing highly effective liquid refrigerant subcooling to provide the highest cycle efficiency. Regarding the dual-stage compressing, using the economizer can improve the efficiency by 5-8%. The condenser contains a refrigerant relief valve sets at 1.6 MPa. Standard maximum waterside working pressure is 1.0 MPa. The waterside is hydraulic tested at 1.5 times of maximum working pressure.



Water Box

The removable water boxes are fabricated of steel. The design working pressure is 150 PSIG (1034 kPa) and the boxes are tested at 225 PSIG (1551 kPa). Integral steel water baffles are located and welded within the water box to provide the required pass arrangements. The nozzle connections are suitable for flanges and are capped when shipment. Plugged 3/4" drain and vent connections are provided in each water box.



Orifice

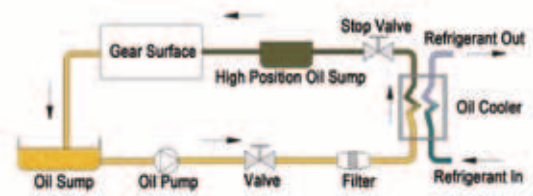
For proper refrigerant flow control and reliable throttling, Midea “smart star” design applies a fixed single-hole orifice system. It eliminates thermal expansion valves, float valves, and other moving parts. Since there are no moving parts, it can achieve high reliability and minimum the possibility of failure.

Control Panel

Midea adopts the state-of-the-art microprocessor control system with 10.4 inch LCD touchable screen and high disturbance resistance. The LCD touchable screen with graphical display of chiller parameters, fast and easy to access makes the operation relatively simple. It also can communicate with the user's PC and carry out the remote control for start, operation and stop of the cooling system. More than 30 item protections and malfunctions used to make the chiller operation secure and reliable. The latest 10 items of failure information can be recorded for inquiry.



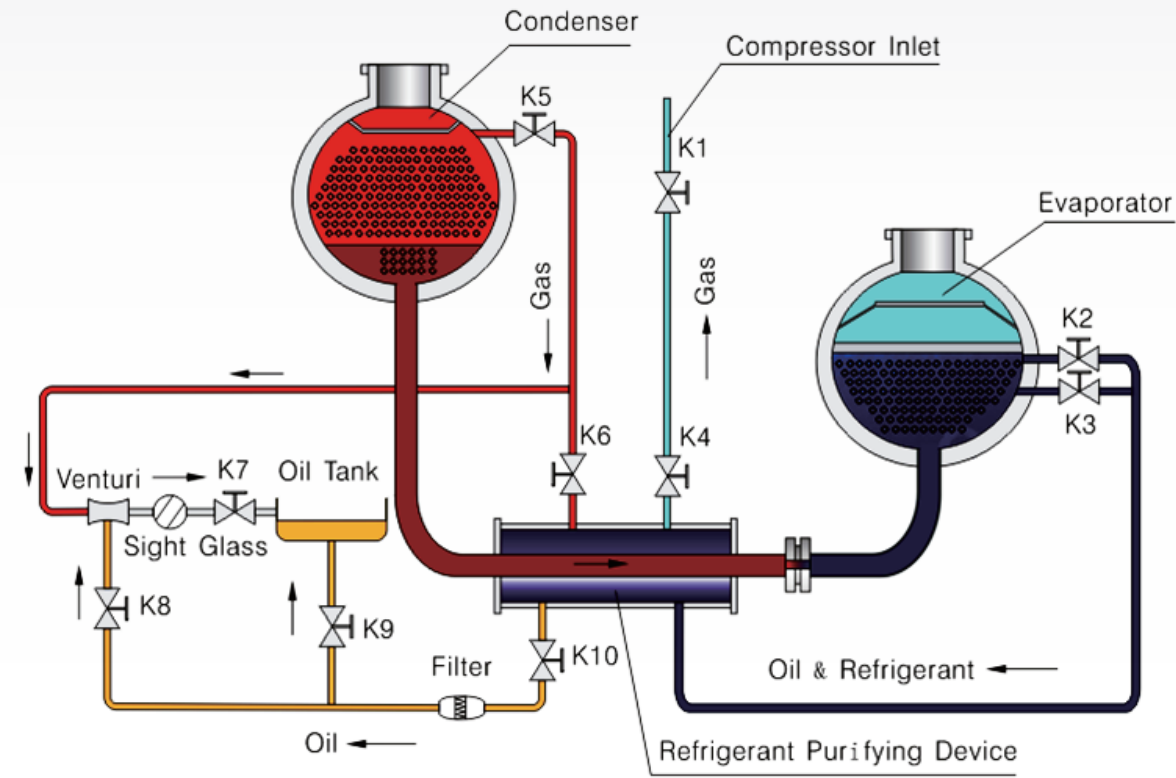
Lubrication System



A separately driven electric oil pump assembly supplies lube to the compressor at proper temperature and pressure .After filtration the lube been pressed to the oil cooler to cooling it to certain temperature. And then adjust its pressure before transmitted to bearings. Special designed seals are installed at inner side of motor bearings at both ends to minimize the lube that leaked into the main motor and mixed into the R134a in evaporator. Besides, electric heater is used inside the oil tank to maintain the oil in proper temperature all the time. In this way, when the compressor shuts down, certain oil temperature can be maintained. Thus prevent the R134a gas from entering the oil to decrease the efficiency of lubrication. Therefore, while the compressor is shut down, it is necessary to keep oil heater on to make the oil temperature in certain temperature. If the compressor will out of service for a long time, it is required to run the oil heater to maintain the proper oil temperature.

OIL CLAIM

reclaim system



During the running of refrigeration unit, it is inevitable that a small amount of lube interfuses into the refrigerant, especially when the cooling load is very low. The mixed oil-refrigerant goes through compressor bearings and gearbox, and then interfuses into the condenser. Because the density of lube is higher than refrigerant, after the refrigerant was evaporated the lube will float on the liquid refrigerant. Midea patent designed oil reclaim device is factory mounted below the condenser. The oil reclaim system is capable of return the oil from the heat exchanger back to the oil tank with high efficiency. Thus it will improve the refrigerant purity to increase the efficiency of chiller and supply sufficient oil to compressor.

No.	Valve		K2 and K3	K4	K6	K7	K8	K9
	Process							
1	Manual	Separation of refrigerant and oil	○	○	×	×	×	×
		Oil reclaim	×	×	△	×	×	○
2	Automatic		○	○	×	○	○	×
3	When oil reclaim system not used		×	○	×	×	×	×

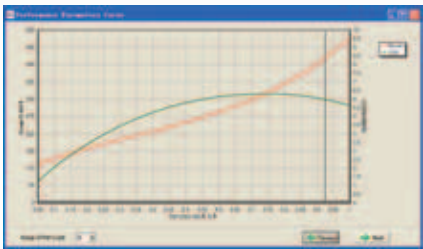
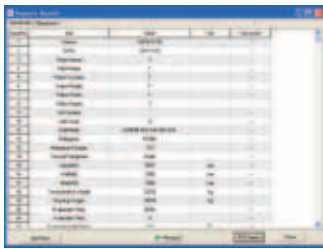
Note: ○: on ×: off △: micro open K1、K5、K10 keep open

SELECTION SOFTWARE

For optimize the configuration and performance of Midea product, as well as to match the actual requirements of your HVAC system. Midea launched its first generation chiller products selection software at the end of 2010. This independent software can select the best components configuration according to the requirement of your HVAC system. After input the general parameters such as cooling capacity, fouling factor, pass number, power supply, etc. Nominal data and physical data for typical compressor-evaporator - condenser combinations are given by product list. Midea R&D fellow and software engineers will update the improvement information of the product online in time, and our customer can get the update information through the internet.



Selection output



Part load performance Curve

OPTIONS

- Across the line starter
- Auto-transformer starter
- Higher water side pressure, 1.6Mpa
- Communication protocol: Hostlink/Modbus.
- 10kV power supply for 650~2000RT
- ABB high voltage vacuum contactor and protection module
- Refrigerant isolation valves on condenser
- Customized pass on evaporator/condenser
- Customized marine water box on evaporator/condenser
- Sectional shipment
- Spring vibration isolation
- Evaporator shell is 1-1/2 Inch (40mm) insulation
- Evaporator/condenser water pipe victaulic connection
- Fouling factor: Evaporator 0.0172~0.344m²k/kW, condenser 0.044~0.344m²k/kW.

Note:Some of the options list above may not be useful for specific regions.

CONVERSION TABLE

■ Temperature:°F—

Formulas: C = (F - 32) × 5 / 9, F = (C × 9 / 5) + 32							
Fahrenheit	Celsius		Fahrenheit	Celsius		Fahrenheit	Celsius
-20.2	-29.0		41.0	5.0		102.2	39.0
-18.4	-28.0		42.8	6.0		104.0	40.0
-16.6	-27.0		44.6	7.0		105.8	41.0
-14.8	-26.0		46.4	8.0		107.6	42.0
-13.0	-25.0		48.2	9.0		109.4	43.0
-11.2	-24.0		50.0	10.0		111.2	44.0
-9.4	-23.0		51.8	11.0		113.0	45.0
-7.6	-22.0		53.6	12.0		114.8	46.0
-5.8	-21.0		55.4	13.0		116.6	47.0
-4.0	-20.0		57.2	14.0		118.4	48.0
-2.2	-19.0		59.0	15.0		120.2	49.0
-0.4	-18.0		60.8	16.0		122.0	50.0
1.4	-17.0		62.6	17.0		123.8	51.0
3.2	-16.0		64.4	18.0		125.6	52.0
5.0	-15.0		66.2	19.0		127.4	53.0
6.8	-14.0		68.0	20.0		129.2	54.0
8.6	-13.0		69.8	21.0		131.0	55.0
10.4	-12.0		71.6	22.0		132.8	56.0
12.2	-11.0		73.4	23.0		134.6	57.0
14.0	-10.0		75.2	24.0		136.4	58.0
15.8	-9.0		77.0	25.0		138.2	59.0
17.6	-8.0		78.8	26.0		140.0	60.0
19.4	-7.0		80.6	27.0		141.8	61.0
21.2	-6.0		82.4	28.0		143.6	62.0
23.0	-5.0		84.2	29.0		145.4	63.0
24.8	-4.0		86.0	30.0		147.2	64.0
26.6	-3.0	87.8	31.0	149.0	65.0		
28.4	-2.0	89.6	32.0	150.8	66.0		
30.2	-1.0	91.4	33.0	152.6	67.0		
32.0	0.0	93.2	34.0	154.4	68.0		
33.8	1.0	95.0	35.0	156.2	69.0		
35.6	2.0	96.8	36.0	158.0	70.0		
37.4	3.0	98.6	37.0	159.8	71.0		
39.2	4.0	100.4	38.0	161.6	72.0		

Climate Solution for Green Environment

■ Pressure: PSI—kPa—kg/m²

Formulas: 1psi ≈ 6.894757 kpa 1psi ≈ 0.070306958kg/m²											
PSI	kPa	kg/m²	PSI	kPa	kg/m²	PSI	kPa	kg/m²	PSI	kPa	kg/m²
1.0	6.89	0.07	41.0	282.69	2.88	81.0	558.48	5.69	121.0	834.27	8.51
2.0	13.79	0.14	42.0	289.58	2.95	82.0	565.37	5.77	122.0	841.16	8.58
3.0	20.68	0.21	43.0	296.47	3.02	83.0	572.26	5.84	123.0	848.06	8.65
4.0	27.58	0.28	44.0	303.37	3.09	84.0	579.16	5.91	124.0	854.95	8.72
5.0	34.47	0.35	45.0	310.26	3.16	85.0	586.05	5.98	125.0	861.84	8.79
6.0	41.37	0.42	46.0	317.16	3.23	86.0	592.95	6.05	126.0	868.74	8.86
7.0	48.26	0.49	47.0	324.05	3.30	87.0	599.84	6.12	127.0	875.63	8.93
8.0	55.16	0.56	48.0	330.95	3.37	88.0	606.74	6.19	128.0	882.53	9.00
9.0	62.05	0.63	49.0	337.84	3.45	89.0	613.63	6.26	129.0	889.42	9.07
10.0	68.95	0.70	50.0	344.74	3.52	90.0	620.53	6.33	130.0	896.32	9.14
11.0	75.84	0.77	51.0	351.63	3.59	91.0	627.42	6.40	131.0	903.21	9.21
12.0	82.74	0.84	52.0	358.53	3.66	92.0	634.32	6.47	132.0	910.11	9.28
13.0	89.63	0.91	53.0	365.42	3.73	93.0	641.21	6.54	133.0	917.00	9.35
14.0	96.53	0.98	54.0	372.32	3.80	94.0	648.11	6.61	134.0	923.90	9.42
15.0	103.42	1.05	55.0	379.21	3.87	95.0	655.00	6.68	135.0	930.79	9.49
16.0	110.32	1.12	56.0	386.11	3.94	96.0	661.90	6.75	136.0	937.69	9.56
17.0	117.21	1.20	57.0	393.00	4.01	97.0	668.79	6.82	137.0	944.58	9.63
18.0	124.11	1.27	58.0	399.90	4.08	98.0	675.69	6.89	138.0	951.48	9.70
19.0	131.00	1.34	59.0	406.79	4.15	99.0	682.58	6.96	139.0	958.37	9.77
20.0	137.90	1.41	60.0	413.69	4.22	100.0	689.48	7.03	140.0	965.27	9.84
21.0	144.79	1.48	61.0	420.58	4.29	101.0	696.37	7.10	141.0	972.16	9.91
22.0	151.68	1.55	62.0	427.47	4.36	102.0	703.27	7.17	142.0	979.06	9.98
23.0	158.58	1.62	63.0	434.37	4.43	103.0	710.16	7.24	143.0	985.95	10.05
24.0	165.47	1.69	64.0	441.26	4.50	104.0	717.05	7.31	144.0	992.85	10.12
25.0	172.37	1.76	65.0	448.16	4.57	105.0	723.95	7.38	145.0	999.74	10.19
26.0	179.26	1.83	66.0	455.05	4.64	106.0	730.84	7.45	146.0	1006.63	10.26
27.0	186.16	1.90	67.0	461.95	4.71	107.0	737.74	7.52	147.0	1013.53	10.34
28.0	193.05	1.97	68.0	468.84	4.78	108.0	744.63	7.59	148.0	1020.42	10.41
29.0	199.95	2.04	69.0	475.74	4.85	109.0	751.53	7.66	149.0	1027.32	10.48
30.0	206.84	2.11	70.0	482.63	4.92	110.0	758.42	7.73	150.0	1034.21	10.55
31.0	213.74	2.18	71.0	489.53	4.99	111.0	765.32	7.80	151.0	1041.11	10.62
32.0	220.63	2.25	72.0	496.42	5.06	112.0	772.21	7.87	152.0	1048.00	10.69
33.0	227.53	2.32	73.0	503.32	5.13	113.0	779.11	7.94	153.0	1054.90	10.76
34.0	234.42	2.39	74.0	510.21	5.20	114.0	786.00	8.01	154.0	1061.79	10.83
35.0	241.32	2.46	75.0	517.11	5.27	115.0	792.90	8.09	155.0	1068.69	10.90
36.0	248.21	2.53	76.0	524.00	5.34	116.0	799.79	8.16	156.0	1075.58	10.97
37.0	255.11	2.60	77.0	530.90	5.41	117.0	806.69	8.23	157.0	1082.48	11.04
38.0	262.00	2.67	78.0	537.79	5.48	118.0	813.58	8.30	158.0	1089.37	11.11
39.0	268.90	2.74	79.0	544.69	5.55	119.0	820.48	8.37	159.0	1096.27	11.18
40.0	275.79	2.81	80.0	551.58	5.62	120.0	827.37	8.44	160.0	1103.16	11.25